# All Active Operational Improvements Report

Identifier: 101101

Name: Current Flight Plan Support

Description: A Flight Plan (FP) is a pilot's stated intentions to conduct a flight by documenting the who, where, when, what, and how of the flight. It also contains some required information related to potential emergency situations. The "how" part of the flight not only specifies the route to be flown but also the type of flight; for example, will the flight be under Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) or a combination of both. The "where" determines whether the FP will be domestic or international. The FAA clearly and aggressively encourages pilots to file a FP, if for no other reason than for timely Search and Rescue protection. It has also been shown statistically that when a pilot makes the effort to file a FP, he/she will, more often than not, obtain a more thorough pre-flight briefing on weather, NOTAMs (Notice To Airmen), potential flight hazards, etc., which enhance the safety of the flight. Although all Air Traffic Service (ATS) facilities have some duties associated with flight plan support, the FAA's Automated Flight Service Stations (AFSS) and Automated International Flight Service Stations (AIFSS) are the ATS facilities primarily responsible for providing flight-planning services for the civil and military pilots operating in this country.

The first step in flight plan support is constraint checking. This may be done through automated methods using FAA provided advisory information, or by contacting the AFSS. The initial focus of Flight Plan Support is on the Weather Briefing. The Airmans Information Manual states that pilots-in-command, before beginning a flight shall familiarize themselves with all available information concerning that flight. Flight Service Stations are the primary source for obtaining preflight briefings and in-flight weather information. Pilots may walk into a Flight Service Station to review available aviation weather products and charts, or they may choose to use telephones, voice radio communications, or personal computer using the Direct User Access Terminal (DUAT) service. Flight Service Specialists have access to various types of aeronautical information in order to properly prepare comprehensive pre-flight briefings; assisting the flight en route; and assisting the airport owner in developing a master plan for maintenance, security, and improvement of the airport. This information consists of weather observations, forecasts and advisories; status of navigational aids; and airport conditions. Weather information is provided by the FSDPS and is tailored to what is important along a planned route of flight. Other information available via the Flight Service Data Processing System, (FSDPS), to assist the Flight Service Specialist in preparing briefings includes: Notices to Airmen (NOTAM). This information notifies controllers and pilots of changes in the status of airports and associated equipment. NOTAMs are forwarded to the FSDPS via the Weather Message Switching Center Replacement, (WMSCR) from the Consolidated NOTAM System. Pilot reports (PIREPS) from airborne aircraft provide a means of determining the weather conditions en route at a given altitude. PIREPs are entered manually into the AFSS facility by Flight Service Specialists and processed and distributed by the FSDPS network to tower, Terminal Radar Approach Control, (TRACON), and Air Route Traffic Control Center, (ARTCC) facilities via WMSCR. It is also made available to the DUAT service.

Once the constraints have been evaluated, a flight plan is prepared and submitted for filing. Pilots filing FPs in the NAS can use the following options:

Filing a FP with an AFSS (Walk-in, Radio, Fast File, Broadcast or Telephone)
Filing a FP with an Commercial Service Provider
DUATS
AIS, (Aeronautical Information System) (Military & Air Carrier, Military Base Operations, [MBO])
Filing with an Airline Operations Center, (AOC) (Air Carriers, MBO)
Filing with a FP with an ARTCC, TRACON, CERAP, ATCT, RAPCON, RATCF

When a flight plan is received into the system the flight plan is checked for errors and conformance to flow constraints. When a FP is filed person-to-person, the Specialist (AFSS, BASOPS, AOC, etc.) receiving it checks it for omissions, errors, format, and timeliness. The AFSS Specialist then enters it into the M1FC, which sends it to the FSDPS. The FSDPS is a system designed solely for managing the massive database containing FPs, weather, etc. AFSSs also use AIS, but only as a backup for the M1FC, and then primarily as the backup for the Air/Ground weather briefing positions. The FSDPS also checks the FP for errors in continuity and format and, if the FP is correct, it routes the FP to the ARTCC's Host Computer System (HCS) at the proper lead-time. Whether filed via an AFSS or through another method, the HCS will also check the FP for errors and NAS traffic constraints. If problems are found the FP is rejected.

The final checking is conducted when the FP is ultimately routed to the FSP (Flight Strip Printer) at the ARTCC Sector and/or the FDIO (Flight Data Input/Output) printer at the terminal facility to be checked by the controller who will first work the aircraft. The Flight Data, Clearance Delivery, Departure or Arrival Controller, or even an Enroute Controller if proposed off a non-controlled airport outside the TRACON's airspace, checks the FP to ensure it complies with the routing and altitudes mandated by the Air Traffic Control directive, Inter-facility Letters-of-Agreement, and internal procedures. He/she then makes any additions, changes, etc., as needed for compliance and files the Flight Strip in the designated location for proposal strips. Feedbacks on these constraints on the FP and service provider changes to the FP are provided to the pilot at clearance delivery. These changes may not be acceptable to the pilot and the user may reject the FP. A new plan will then need to be developed and submitted to the NAS.

Benefits: Current operations are provided in the NAS.

Time Frame: As Implemented

Earliest IOC - Latest IOC: -

Solution Set(s): None

Service: Flight Planning

Capability: Flight Plan Support

Lead Organization: Not Assigned - Not Assigned

Update Date: 21-Jan-2010 by David Bartlett

ID / Revision: 42 / 2

---

Identifier: 101102

Name: Provide Full Flight Plan Constraint Evaluation with Feedback

Description: Timely and accurate national airspace system (NAS) information enables users to plan and fly routings that meet their objectives. Constraint information that impacts the proposed route of flight is incorporated into air navigation service provider (ANSP) automation, and is available to users. Examples of constraint information include special use airspace status, SIGMETS, infrastructure outages, and significant congestion events.

Constraint information is both temporal and volumetric. Constraint volumes can be "hard constraints" (no access to this volume for this time period), "conditional constraints" (flights are subject to access control), and "advisory constraints" (service reduction or significant weather). Flight trajectories are built from the filed flight plan and the trajectory is evaluated against the constraint volumes. Feedback is provided to the filer (not the flight deck) on the computed trajectory with a listing of constraints, the time period for the constraints, and the nature of access.

A user can adjust the flight plan based on available information, and refile as additional information is received, or can wait for a later time to make adjustments. Up to NAS departure time, as constraints change, expire, or are newly initiated, currently filed flight plans are retested. Update notifications are provided to filers if conditions along the trajectory change. In addition, the user can submit alternative flight plans.

Benefits: *Improved efficiency
*Increased user-preferred routing
*Improved predictability
*Reduced fuel-burn and engine emissions

Time Frame: Mid Term

Earliest IOC - Latest IOC: 2013 - 2018

Solution Set(s): Improve Collaborative ATM

| | |
|---|---|
| Service: | Flight Planning |
| Capability: | Flight Plan Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 02-Feb-2010 by Frank Hermann |
| ID / Revision: | 41 / 7 |

---

| | |
|---|---|
| Identifier: | 101103 |
| Name: | Provide Interactive Flight Planning from Anywhere |
| Description: | Flight planning activities are accomplished from the flight deck as readily as any location. Airborne and ground automation provide the capability to exchange flight planning information and negotiate flight trajectory agreement amendments in near real-time.<br><br>The key change is that the air navigation service provider's (ANSP) automation allows the user to enter the flight plan incrementally with feedback on conditions for each segment. Rather than testing full trajectories by submitting and waiting for full routes evaluations, the system will test each segment as entered and provide feedback. Through this process the user will work with the system to quickly reach a flight plan agreement. As before any subsequent change, constraint, preference, or intent triggers a full flight plan review with feedback to the filer.<br><br>The filer can develop preferred trajectories that may include an identified constraint that the automation system maintains in case subsequent changes to conditions will allow its promotion to agreement. Automation thus maintains multiple flight plans for an individual flight. |
| Benefits: | ·Increased efficiency<br>·Increased accessibility<br>·Enhanced user-preferred trajectories |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2015 - 2021 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | Flight Planning |
| Capability: | Flight Plan Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 23-Mar-2010 by David Bartlett |
| ID / Revision: | 43 / 19 |

Identifier: 101201

Name: Current Flight Data Management

Description: The requirements for handling of the flight data is dependent on the type of the Flight Plan, (FP) initiating the data management of the flight. Flight Plans can be broken down into two types, those that do not require an ATC (Air Traffic Control) Clearance (VFR) and those that do require an ATC Clearance (IFR). Although FAA's Flight Plan form indicates three types of FPs, there are actually only two basic types; i.e. VFR and IFR. The third check in the FAA's FP form is for Defense Visual Flight Rules (DVFR). All other types of FPs are a combination or abbreviation of these two basic types. Flight Plans can be further categorized as Domestic, or International. Domestic FP procedures (FAA and Military) are used for flights in the Continental U.S. (CONUS), Canada, and the Honolulu, Alaskan, and San Juan domestic control areas. International, or ICAO, FPs are required if the flight takes the aircraft into any other nation's airspace, regardless of the type flight, except for transborder, over land, to/from Mexico and Canada. VFR FPs are for flights conducted under VMC (Visual Meteorological Conditions) as specified in the FARs and are commonly referred to as the rule of see and be seen. Each branch of the military and U.S. Coast Guard (USCG) requires VFR FPs per Department of Defense (DoD)/USCG regulations even though the FAA does not require them. The military have their own rules and regulations concerning the filing of FPs for their VFR flights.

DVFR FPs are for VFR flights that will cross our national borders or, more specifically, those that will enter, cross, or operate in the Contiguous U.S. (CONUS) Air Defense Identification Zone (ADIZ). IFR FPs are mandatory if any portion of the flight will be under Instrument Flight Rules because IFR flights require separation from other flights by ATC. Special VFR FPs are for short-range flights, within specific Classes of airspace, in lower weather conditions than those required for VFR flight. In fact, one could say they are quasi-IFR flights. SVFR flight requires an ATCl) clearance, but as the name implies, special VFR operating rules apply. IFR/VFR Composite Flight Plans are for flights that contain both VFR and IFR segments, (also referred to as legs). Just as for a normal VFR flight, the VFR portions of an IFR/VFR Composite flight do not require that a VFR FP be filed. If a FP is filed for the VFR leg(s), a separate FP for each leg is required and the pilot must activate and close the FP for each VFR leg of the flight with an AFSS/AIFSS.

There is one more FP that is not truly a Type of FP but needs to be discussed here. VFR OTP (VFR-On-Top, or, as they say internationally, Over-The-Top) is not truly a type of FP but, rather an altitude assignment for an IFR FP. However, for those that use it extensively, VFR OTP is synonymous with a type of flight and an altitude assignment of OTP carries with it more requirements than maintaining a hard altitude; i.e.: restrictions imposed after sunset, flight between cloud layers, etc., none of which are imposed for pure VFR or IFR flight. Further, when one advises an AFSS Specialist that they desire to file a VFR OTP FP, the Specialist knows immediately what is desired. Therefore, for the sake of covering all bases, and because flying VFR OTP is completely different than other types of FP, it will be discussed here as though it were genuinely a unique type.

The FARs does not require Air Carriers, Commuters or Air Taxis to file VFR FPs with the FAA. However, each company must file, and maintain, an Operations Manual at one of the FAAs Flight Standards Field Offices. If an Air Carrier's Operations Manual does not mandate the filing of a VFR flight plan with the FAA, the FAR requires the company to have Flight Locating Requirements for Commuter and Air Taxi certificate holders. Typically, the larger Air Carrier companies do not pass VFR FPs to the FAA since they perform their own flight watch duties and generally maintain direct radio contact with their aircraft throughout the flight. However, Commuters and Air Taxi certificate holders do tend to file VFR FPs with the FAA since their companies normally are not large enough to handle their own flight monitoring tasks.

VFR FPs can be entered into the NAS via the Model One Full Capacity, (M1FC),Aeronautical Information Service, (AIS), Flight Data Input/Output,(FDIO), or Automated Radar Terminal System, (ARTS), if the pilot is requesting Flight Following and Traffic Advisory Service. The FP will be forwarded to the appropriate controller at the appropriate time, just as in the case of an IFR FP. However, for an ARTS-entered VFR FP, the data that is forwarded facility-to-facility and controller-to-controller is limited in scope and content to that needed to determine direction of flight, destination, and type aircraft/equipment on board.

The Flight Service Data Processing System, (FSDPS), holds the VFR FP in storage until time for distribution, which is when the FP's P-Time is less than two hours from current time (i.e.: P-Time minus 1 hr, 59 min, 59 sec). The FP is then placed in the Proposed Departure List for the departure airport's tie-in AFSS and displayed on that AFSS's M1FC. When the VFR FP is activated by the pilot and the Specialist has transmitted a Departure message, the FSDPS moves the FP data to the Arrival List of the destination tie-in AFSS.

In addition to the normal VFR distribution and processing, for air defense purposes a DVFR FPs and inbound transborder flights from Mexico and Canada on Domestic VFR FPs must also be specifically routed to additional recipients. The recipients are the U. S. Military's Air Defense, the appropriate one of the three Automated International Flight Service Stations (AIFSS), and the specific Air Route Traffic Control Center (ARTCCs) in whose airspace the flight will enter. As appropriate, an informational copy of the FP will also be sent to the offices of Customs, Drug Enforcement, Agriculture, and Immigration.

Domestic IFR FP information is normally passed between ARTCCs from HCS to HCS via PAMRI (Peripheral Adapter Modules Replacement Item) and from ARTCCs to terminal via ARTS and FDIO. However, international flights are passed directly to foreign ACCs (Area Control Centers) via the National Airspace Data Interchange Network, (NADIN)/AFTN (Aeronautical Fixed Telecommunications Network). Also, for those domestic flights whose routing has 20 or more elements (10 in non-automated situations) outside the originating ARTCC's airspace, the flight plan and/or flight progress data is passed via NADIN-II to each of the subsequent ARTCCs that will work the aircraft.

When the routing will take the aircraft into or though a terminal's airspace, the HCS of the host ARTCC (ARTCC whose airspace overlies the terminal airspace) forwards the information to that terminal facility's ARTS and FDIO. For Tower Enroute flights (flights that will be worked by two or more successive terminal facilities), the Flight Plan and flight progress data is passed from ARTS to ARTS through the host ARTCC's HCS. If those terminal facilities lie on an ARTCC airspace boundary, the data passes from the ARTS to the host ARTCC's HCS to the host ARTCC of the other facility and then to the receiving terminal facility's ARTS. This is called Host/Non-Host processing.

A copy of all IFR FPs is sent to the ATCSCC (Air Traffic Control Systems Command Center) via NADIN-II for Traffic Management purposes. Once the Traffic Management restrictions are applied at the HCS level, as appropriate, the modified FP is distributed to the departure ATCT, TRACON, etc.

The distribution of ICAO FPs to the HCS is the same as for domestic FPs. However, immediately upon receipt (even if it's the day prior to departure), the FSDPS sends the ICAO FP to NADIN-II (which may send it to NADIN-I) for distribution to the appropriate foreign ATC facilities, called Area Control Centers (ACC). NADIN-II/I sends the FP via the AFTN, which is the ICAO supported data communications network for ATC. Both NADIN-I and NADIN-II networks include the AFTN messaging capability plus other capabilities such as weather, NOTAMs, etc.

The AFTN equipment at the ACCs that will receive the FP and follow-up messages determines whether the FP goes to NADIN-II or on to NADIN-I. Many, if not most, ACCs around the world still use message switching networks (MSN), or even old teletype systems, and, therefore, cannot communicate with the NADIN-II packet-switching network (PSN). If such is the case, NADIN-II sends the FP to NADIN-I for forwarding via AFTN. If the addressee(s) have PSN AFTN systems, NADIN-II will forward the FP.

Support for maintenance of the flight can also vary by flight plan type. Regardless of type, the pilot-in-command of the aircraft is responsible for keeping the FP information current including the revision of any parts of the FP. Pilots often delay their departure and sometimes extend or lengthen their time enroute due to the necessity of circumnavigating thunderstorms, making unanticipated landings due to strong headwinds requiring more fuel to reach their destinations. Regardless of whether the flight is VFR or IFR, the pilot-in-command is the person who must keep in mind the potential for delays, changes of route, change of destination, etc., that may lead to concern at the destination and even generate unnecessary Search & Rescue (SAR) efforts. All ATC/AFSS facilities can, and will, accept amendments, cancellations, and FP closures

IFR FPs, revisions, cancellations, etc., are passed from HCS to HCS and from HCS to various terminal facilities via the FDIO and the Automated Radar Terminal System (ARTS-IIE, ARTS-IIIA, ARTS-IIIE, Common ARTS (C-ARTS), and Micro Enroute ARTS (MEARTS)).The IFR FPs are retained in the NAS only for a short duration (normally two hours) following the P-Time. If the P-Time on the filed FP lapses beyond the HCS-programmed retention time for proposed departures, the FP will be discarded by the NAS.

The retention time for Proposed IFR FPs is variable by ARTCC and is sometimes shortened due to heavy traffic loads caused by special events such as the Super Bowl, Masters Golf Tournament, Indianapolis 500 Race, etc.

The time parameter for IFR FP retention is variable by ARTCC, but applies to all airports in that ARTCC's airspace; therefore, it could have the opposite effect on another high-density airport in the same ARTCC's jurisdiction. It's easy to see why the responsibility to update the P-Time for individual flights is placed on the pilot and why this parameter is changed only after serious consideration of the consequences.

Flight plan activation also varies by flight plan type. Federal Air Regulations hold the pilot responsible for activating his/her FP and, for VFR FPs, it should be done by the pilot contacting the AFSS on air/ground radio. However, sometimes, the pilot requests the ATCT Controller, AOC Dispatcher or a company representative to notify the AFSS of his/her departure time. A second party activating the FP is acceptable so long as the pilot initiates the action. No one should take it upon him/herself to do the pilot a favor by activating the FP for someone else without their knowledge. As discussed below, if the pilot doesn't know the FP was activated, he/she will not attempt to close it, which could result in Search and Rescue being activated.

IFR FPs are automatically activated when the ARTS sends a Departure Message (DM) to the HCS as soon as the system sees the target on the radar. In non-ARTS, non-radar and for non-discreet beacon code aircraft, the Controller must manually enter the DM in the FDIO or, if the ARTS is operating, the ARTS. .

By FAR the pilot-in-command of the aircraft is held accountable for opening (activating) and closing (or canceling) an active FP. The pilot-in-command is responsible for ensuring the P-Time is updated as required, canceling the FP if he/she elects not to use the FP and, most importantly, to close the FP upon arrival at the destination or point designated in the FP as the cancellation point.

If the pilot or other authorized person activated the VFR FP, the FAA Specialists/Controllers must ensure that the aircraft has landed and the FP has been closed before it can be forgotten. Otherwise, the Search and Rescue (SAR) procedures must be activated. Pilots flying IFR must ensure their FPs are closed with the ATC facility responsible for their separation. This will be done automatically at a controlled airport, but at and uncontrolled airport (in Class G) airspace, the pilot must notify the controlling facility that he/she has landed and the FP should be closed. .
When a military cross-country flight land, the ATCT (military or civil) Controller notifies the AFSSD at the tie-in AFSS, of the down time and he/she closes the flight notification message.

Benefits: Current operations are provided in the NAS.

Time Frame: As Implemented

| | |
|---|---|
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | Flight Planning |
| Capability: | Flight Data Management |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 2 / 2 |

---

Identifier: 102105

Name: Current Oceanic Separation

Description:

The FAA provides oceanic air traffic services to aircraft flying within specific flight information regions (FIRs). These regions include a portion of the western half of the North Atlantic Ocean, much of the Caribbean region, a large portion of the Arctic Ocean, and a major portion of the Pacific Ocean. The oceanic domain consists of oceanic air route traffic control centers (ARTCCs) and offshore sites. The New York and Oakland oceanic centers are responsible for oceanic airspace, while the Anchorage ARTCC provides en route (including radar coverage) and oceanic air traffic services for all Alaskan airspace. The current oceanic aircraft-to-aircraft separation service uses a combination of flight strip-intensive manual air traffic controller procedures, limited automation aids, complex procedural separation rules, airspace design, and communications to ensure safe separation over an enormous area where independent surveillance is not feasible. Oceanic airspace includes some "exclusionary" airspace, where the available oceanic Air Traffic Management services depend on aircraft equipment.

Aircraft communications range from high frequency (HF), very high frequency, and ultra high frequency radios to satellite-based data links. ARTCCs located in New York, Oakland, and Anchorage Federal Aviation Administration (FAA)- oceanic separation provide assurance services. Although co-located with en route facilities, and sharing some common elements, oceanic and en route operations differ significantly in many respects. Operations between the three FAA oceanic facilities also differ significantly due to differences in geography, traffic flows, controller tools, and technical and physical interfaces.

The primary difference between oceanic and en route separation assurance services is lack of independent surveillance and lack direct pilot/controller communications capability in oceanic sectors. This lack of capabilities is caused by line-of-sight constraints that prevent radar surveillance and normal VHF or UHF voice radio communications. Voice communications between oceanic sector controllers and pilots are relayed through a third-party commercial communications service provider using HF radio frequencies, which are noise-prone and subject to atmospheric interference. If the aircraft has satellite-voice telephone capability, a direct pilot-to-controller voice link can be used. The high cost of this type of service generally limits its use to emergency situations. The communications service provider also provides an HF voice patch to enable direct pilot-controller voice communications, but this service is also generally reserved for emergency situations due to time and cost considerations.

Oceanic separation assurance is primarily procedural, based on position reports, relatively large separation minima, procedural separation rules, airspace structure, and avionics performance capabilities. Position reporting often depends on the crew's determination of aircraft position using such onboard equipment as inertial navigation systems or inertial reference units, and global positioning system receivers. Procedural separation in the oceanic environment is much more strategic than the tactical radar-based separation provided in the en route and terminal environments. The primary controller tools for providing separation assurance are paper flight strips, the airspace and oceanic track design, and the controller's knowledge of procedural separation rules. In the New York and Oakland centers, the Oceanic Display and Planning System (ODAPS)provides a situation display of controlled aircraft estimated positions in oceanic airspace. These positions are based on the extrapolation of filed flight plan data and are updated by periodic HF voice position reports, position reports via Oceanic Data Link from Future Air Navigation System (FANS) 1/A-equipped aircraft, or controller input. The ODAPS also supports a procedural conflict probe capability. Controllers use the ODAPS interim situation display (ISD) for planning and situational awareness. The ISD does not provide the controller decision support tools and thus is not used as the primary means for procedural separation.

The Advanced Technologies and Oceanic Procedures (ATOP) is a new system installed at the Oakland and New York oceanic facilities. ATOP has a situation display presentation, similar to those used in en route Air Traffic Control (ATC) operations. ATOP provides surveillance data processing capable of processing primary and secondary radar, and Automatic Dependent Surveillance - Addressable and Automatic Dependent Surveillance - Broadcast. The oceanic situation displays are not certified for separation and are used for planning and situational awareness only. A fully integrated flight data-processing capability combined with the surveillance data provide the controller with improved trajectory information.

Oceanic separation assurance is usually provided in three dimensions relative to the aircraft trajectory: vertical, lateral, and longitudinal separation. This is generally for aircraft using instrument flying rules assigned to an oceanic organized track system, which applies to most aircraft crossing oceanic airspace. Current oceanic separation minima are typically 2,000 feet vertically, 120 nautical miles (NM) laterally, and 10 minutes longitudinally, which corresponds to 80-100 NM in-trail separation. In a formal Oceanic Organized Track Structure area, the track structure provides the vertical and lateral separation assuming that there is a level flight along the assigned track.

The organized track system makes the most efficient use of heavily traveled oceanic airspace. An oceanic organized track system can be thought of as a three-dimensional stack of mostly parallel or diverging lines, tracing the assigned route along a heavily traveled path between city pairs. Each stack of parallel lines is an oceanic track defined as a series of fixes. The altitude levels within a track are generally separated by the legal vertical separation minima in effect for that airspace. The oceanic track systems are composed of either fixed tracks or flex tracks. The fixed tracks are published and infrequently modified. The flex tracks vary according to the forecast winds and are the most fuel- and time-efficient paths, and are generally separated by the legal lateral separation minima in effect for that airspace. Generally, flex tracks are generated every 12-24 hours to support outbound traffic grouped around the times when most users wish to depart. The flex tracks are plotted to follow the most efficient combination of shortest distances and most favorable winds while avoiding potentially hazardous weather and active special use airspace.

The random track is an oceanic track that is a series of fixes not corresponding to an organized track system. The random track is used as a part of the flight plan, usually in an area where there is less traffic, or by an aircraft unable to meet the equipment requirements in exclusionary airspace. Exclusionary airspace is a volume of controlled airspace that normally excludes aircraft that do not meet specific published equipment and performance requirements. Regardless of type, the oceanic track is structured to provide legal separation for traffic needing separation assurance services. Defining the allowed altitudes of each track and assigning aircraft to those flight levels achieve vertical separation.

The fixes defining an oceanic route or track are generally latitude/longitude coordinates because oceanic airspace is beyond the range of ground-based navigation aids. When plotting oceanic tracks to ensure legal lateral separation, the controller also uses the latitude/longitude grid on his route chart. Lines of latitude are parallel, and 60 NM separates each degree of latitude. If a track is heading due east (or west) along a line of latitude, a parallel track along a line of latitude 2 degrees north or south will be separated by 120 NM. Because most tracks or track segments are not precisely due East (or West), tracks are often routed to the closest intersection of a line of latitude and a line of longitude nearest the desired path, north or south of the latitude of the current fix. The controller applies procedural separation rules when plotting adjacent tracks on a latitude/longitude grid to account for the fact that lines of longitude are not precisely parallel and converge from a 60 NM separation standard at the equator to zero at the poles. Lateral separation reduction to 50 NM is currently deployed in selected routes of the Pacific.

In Reduced Vertical Separation Minima (RVSM) airspace, the legal vertical separation minimum is 1,000 feet. RVSM has been implemented in the North Atlantic and much of the Pacific for selected flight levels. To operate in RVSM airspace, an aircraft must be equipped with redundant altitude measurement systems that meet RVSM criteria, an altitude reporting transponder, an altitude alert system, and an automatic altitude control system. RVSM enables increased airspace capacity for the airspace in which it is applied.

Required Navigation Performance (RNP) is a key requirement for reduced horizontal separation minima (RHSM). RNP measures the aircraft navigation system's statistical ability to maintain horizontal track accuracy. In implementing 50 NM lateral separation minima reduction in selected Pacific areas, aircraft are required to be RNP-equipped and have cumulative horizontal navigation errors, if applicable, that do not exceed 10 NM 95 percent of the time for entire flight. In areas with a threat of severe convective weather conditions, direct controller-to-pilot voice or data communication may be required to facilitate Air Traffic Control coordination should the need arise for a weather deviation clearance. This is in addition to HF voice radio communications capability, which is indirect and uses a third-party radio operator link. The direct controller-to-pilot communication requirement is currently satisfied in the Oakland and New York FIRs by the Multi-Sector Oceanic Data Link capability for FANS-equipped aircraft.

The crew is responsible for keeping the aircraft in compliance with the ATC-cleared flight plan because oceanic airspace is outside of radar and direct controller-to-pilot communications range. The crew must follow a well-defined procedure involving checking and rechecking route data input into the Flight Management System. In the event of equipment failure, navigation error, or the crew's inability to keep the ATC clearance, the crew and ATC separation service providers can follow published procedures. The crew must normally obtain approval from ATC before deviating from the clearance. In an emergency or a weather diversion when communications limitations prevent ATC contact, the procedure is structured to minimize the likelihood of conflict with other traffic. When a weather diversion is necessary and the crew is unable to obtain ATC approval, it will normally divert laterally up to half the width of the lateral track separation minima and climb or descend to an altitude half way between the flight levels assigned to the track. When a pilot undertakes a maneuver without obtaining clearance from the controller, the responsibility for providing separation shifts from the controller to the pilot until the pilot notifies ATC that the aircraft is back on the cleared track and flight level.

Benefits: Current operations are provided in the NAS.

Time Frame: As Implemented

| | |
|---|---|
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 68 / 2 |

---

| | |
|---|---|
| Identifier: | 102108 |
| Name: | Oceanic In-trail Climb and Descent |
| Description: | ANSP automation enhancements will take advantage of improved communication, navigation, and surveillance coverage in the oceanic domain. When authorized by the controller, pilots of equipped aircraft use established procedures for climbs and descents.<br>Improved ANSP automation provides the opportunity to use new procedures and reduce longitudinal spacing for the duration of the procedure. Aircraft are able to fly the most advantageous trajectories with climb and descent maneuvers. |
| Benefits: | ·Improved efficiency<br>·Increased capacity<br>·Reduced fuel burn and engine emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2010 - 2013 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 23-Mar-2010 by David Bartlett |
| ID / Revision: | 66 / 7 |

Identifier: 102112

Name: Current En Route Separation

Description: Separation standards applied in en route airspace consist of rules and procedures for separating aircraft operating under Instrument Flight Rules (IFR) from each other, from protected airspace, and from terrain. En route airspace is classified as Class A, Class E, or Class G airspace. The DSR (Display System Replacement) is the en route controller workstation. The DSR presents a radar display, weather display, airway maps, sector boundaries, adjacent facility boundaries, restricted areas, prohibited areas, or sector-specific information for the controller to provide air traffic services in that sector. Radar controllers must constantly scan radar data and flight data to determine aircraft position, accomplish traffic planning, and resolve conflicts. Constant scanning provides the controller an updated traffic picture to issue clearances to aircraft, to provide timely radar handoffs, traffic advisories, radar point-outs, communication transfers and to monitor compliance with clearances already delivered.

Separation standards are published rules that must be followed and maintained and both en route and terminal controllers receive en route separation standards instruction. The controller accomplishes en route IFR separation by applying one or a combination of radar, non-radar, or visual separation rules. Radar separation is the preferred method; however, controllers are trained to apply the type of separation that will provide the greatest operational advantage.

Radar separation standards are based on equipment adaptation (single or multiple radar sites) and the distance of aircraft from the radar antenna site. The general en route standard is 5 nautical miles (NM) between aircraft at the same altitude. In some mountainous areas radar coverage is not available below certain altitudes. In these areas, controllers apply non-radar rules to separate aircraft. This type of separation is still used exclusively in areas with no radar coverage and during radar failures. Non-radar separation can be vertical, longitudinal, or lateral separation.

Controllers apply vertical separation by assigning different altitudes 1,000 feet apart to a pair of aircraft operating at or below Flight Level (FL) 290. Between FL290 and FL410 inclusive, reduced vertical separation minima allows one thousand feet vertical separation between properly equipped aircraft. Above FL410, the standard increases to 2,000 feet apart. Controllers assign an aircraft to an available altitude or after an aircraft previously at that altitude has reported leaving that altitude. As a general rule, aircraft flying south or west are assigned even cardinal altitudes (e.g. 8,000 feet; FL 240) and aircraft flying north or east are assigned odd cardinal altitudes (e.g. 9,000 feet; FL250).
Controllers apply longitudinal separation rules to ensure that no more than one aircraft occupies a geographic location at the same time and at the same altitude. Longitudinal separation can be applied to aircraft on the same, converging, or crossing courses. This type of separation can use the speed difference between the aircraft and can be expressed in miles or in minutes from a fix or an airport.

Lateral separation is applied by assigning different routings or holding patterns that do not overlap and to departing aircraft using diverging headings. Visual separation is a clearance from the controller to the pilot that allows the pilot to visually separate his/her aircraft from another aircraft below FL180. The reported weather in the vicinity must be good enough for the pilot to maintain visual contact with the other aircraft.

Controllers obtain the flight data and radar data used to provide separation services between aircraft from various FAA automated systems. The host computer replacement system (HOCSR) is the primary system that presents the radar display to the controller.

Letters of agreement and local procedures between adjacent facilities, contained in standard operating procedures within a facility, can modify en route separation standards. These letters and procedures cannot reduce separation standards as developed and published at the national level, but they can increase the standards and are used to ensure controllers understand what to expect from aircraft coming from an adjacent facility or from an adjacent intra-facility controller.

Once the required separation is obtained, it must be maintained. There are several times in each flight when a change from one type of separation standard to another must be accomplished. The change can be a result of transitioning from one type of airspace to another or transitioning routes and/or altitudes. Proper application of the separation standards can increase the capacity of the National Airspace System (NAS) without changing the separation standard. Procedures are sometimes changed as new separation standards are issued, traffic increases/decreases, or as evaluation of procedures mandates.

Certain information about each aircraft and its intended flight plan are required to provide en route separation and to accomplish point-outs, handoffs, and coordination. The aircraft's call sign and flight number or the aircraft's registration number is required to communicate separation clearances to the flight. The aircraft type is required information as certain en route separation standards change based on aircraft size. Routes of flight and altitude are necessary to apply lateral or vertical en route separation. Estimated times over navigational fixes are required for non radar separation.

Flight data to provide en route separation originates with the pilot or the pilots' company and is generally in the format of a FAA flight plan. The flight data enters the HOCSR through Automated Flight Service Stations (AFSS), military base operations (BASOPS), Direct User Access Terminal System, commercial vendors on the Internet, Airline Operations Center (AOC) pre filed flight plans, or directly from an FAA facility that has direct access to the NAS computer system. Flight data is provided by automated means to the en route controller. Generally, this data is in the form of printed flight progress strips from the Flight Data Input/Output (FDIO) equipment or from computer update or readout messages on the Display System Replacement (DSR) console. Controllers can update or amend the flight database as necessary.

The radar system being used and/or the distance from the radar site that an aircraft is located can determine en route separation standards. Generally, en route radar, such as Air Route Surveillance Radar-3 or -4, comes from multiple sites and is adapted to process the best target data available from the multiple radar sites (mosaic radar adaptation). Radar separation in these instances is 5 NM between aircraft at the same altitude. Certain en route sectors are allowed to use radar separation of 3 NM between aircraft at the same altitude to increase capacity and efficiency. To use this reduced separation a single radar site must be adapted as the sole data input, and the radar separation must occur within 40 NM of that radar antenna site.

The Voice Switching Control System is the en route air/ground and ground/ground radio communication system used to issue clearance instructions to aircraft and monitor compliance. Ground/ground communications are used to coordinate airspace status, relay control instructions, and to complete sector-to-sector and facility-to-facility coordination. Direct radio communications between pilots and controllers are required to use certain en route separation standards. In visual separation, the controller must be in direct radio contact with at least one of the pilots of aircraft being authorized to apply visual separation standards. To use radar vectors to establish lateral separation between a pair of aircraft, the controller must be able to communicate with a minimum of one of the aircraft. When direct radio communications between the en route controller and the pilot are not possible, information and clearances can be relayed via an AFSS, AOC, BASOPS, or over the voice capability of a VOR.

Current weather data is needed to obtain the altimeter setting to define the lowest useable flight level. Pilot reports (PIREPS) of clear air turbulence and rough rides at certain altitudes let the controller know which altitudes to assign aircraft. The location and movement of thunderstorm cells allow the controller to assist the pilot in finding the best routes around the weather and allows controllers to plan future separation tasks. The controller and pilot also require current weather information to determine which separation standards may be applied to aircraft and the type of approach an aircraft can fly. The type of approach an aircraft can fly determines sequencing separation from a previous or subsequent arrival. The en route controller obtains the weather via PIREPS, FDIO messages, and DSR message readouts. The National Weather Service meteorologist at the Center Weather Service Unit provides certain weather to the en route controller via FDIO or relayed through the controller's supervisor.

The traffic management mission is to balance air traffic demand with system capacity to ensure maximum efficient use of the NAS. To manage demand, it is sometimes necessary to place restrictions on aircraft to remain within the system's capacity. Historically Validated Restrictions and dynamic traffic management incentives become de facto en route separation standards. Controllers must enforce these restrictions in their area of responsibility. These increases to the separation standard are generally arrival airport sensitive. Adverse weather in an en route sector can also cause separation minima to increase for all aircraft entering that en route sector for a certain period of time.

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 65 / 2 |

---

| | |
|---|---|
| Identifier: | 102114 |
| Name: | Initial Conflict Resolution Advisories |

| | |
|---|---|
| Description: | The ANSP predicts and resolves conflicts using en route automation. Automation is enhanced not only to recognize conflicts but also to provide rank-ordered resolution advisories to the ANSP. The ANSP may select one of the resolutions to issue to the aircraft.<br><br>Automation enables the ANSP to better accommodate pilot requests for trajectory changes by providing conflict detection, trial flight planning, and development and rank-ordering of resolutions taking into account aircraft capabilities and pilot and ANSP preferences.<br><br>The resolution will be tailored to the communication medium (voice or data communication). In the mid-term, voice communication between the ANSP and the flight operators is expected to be the predominant communication medium; in the far-term, the role of voice communication will diminish. As a result, this capability will support integration with data communications. |
| Benefits: | ·Enhanced safety<br>·Improved efficiency |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2013 - 2017 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 23-Mar-2010 by David Bartlett |
| ID / Revision: | 67 / 7 |

---

| | |
|---|---|
| Identifier: | 102117 |
| Name: | Reduced Horizontal Separation Standards, En Route -3 Miles |
| Description: | The Air Navigation Service Provider (ANSP) provides reduced and more efficient separation between aircraft where the required performance criteria are met, regardless of location other than operations in oceanic airspace.<br><br>Advances in Air Navigation Service Provider (ANSP) surveillance (e.g. ADS-B) and automation allow procedures with lower separation minimums to be used in larger areas of the airspace. This reduces the incidence of conflicts and increases the efficiency of the conflict resolution maneuvers. |
| Benefits: | ·Increased efficiency<br>·Increased capacity |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2018 - 2025 |

| | |
|---|---|
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 57 / 8 |

---

| | |
|---|---|
| Identifier: | 102118 |
| Name: | Delegated Responsibility for In-Trail Separation |
| Description: | Enhanced surveillance and new procedures enable the ANSP to delegate aircraft-to-aircraft separation. Improved display avionics and broadcast positional data provide detailed traffic situational awareness to the flight deck. When authorized by the controller, pilots will implement delegated separation between equipped aircraft using established procedures.<br>Broadcast surveillance sources and improved avionics capabilities provide ANSP and the flight deck with accurate position and trajectory data. Aircraft that are equipped to receive the broadcasts and have the associated displays, avionics, and crew training are authorized to perform delegated separation when assigned by the controller.<br>ANSP will be provided with a new set of (voice or datalink) procedures directing, for example, the flight crews to establish and to maintain a given time or distance from a designated aircraft, including separations equivalent to, but not less than current wake turbulence separations. This interval may be an absolute value, or a relative designation to remain "no closer than" or "no further than". The flight crews will perform these new tasks along paths, including RNAV paths with turns, using new aircraft functionality . |
| Benefits: | ·Improved efficiency<br>·Increased capacity |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2013 - 2018 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 64 / 8 |

| | |
|---|---|
| Identifier: | 102123 |
| Name: | ADS-B Separation |
| Description: | The air navigation service provider (ANSP) automation uses aircraft dependent surveillance broadcast in non-radar airspace to provide reduced separation and flight following. Improved surveillance enables ANSP to use radar-like separation standards and services.<br><br>The ADS-B positional reports are incorporated into the surveillance data processing systems and displayed to the controller. This allows the aircraft to be worked off the radar display with the accompanying procedures that have lower separation minima allowing for improved access and more efficient flight paths. |
| Benefits: | ·Increased safety<br>·Increased capacity and access<br>·Improved search and rescue capabilities |
| Time Frame: | Near Term |
| Earliest IOC - Latest IOC: | 2008 - 2010 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 28-Apr-2010 by David Bartlett |
| ID / Revision: | 63 / 3 |

| | |
|---|---|
| Identifier: | 102129 |
| Name: | Current Terminal Separation |

Description: Terminal air traffic separation consists of rules and techniques to separate aircraft on and around airports. The type of airspace around an airport and the size of the aircraft being separated determine the separation standard that must be applied. Radar and non radar controllers in Air Traffic Control Towers, Terminal Radar Approach Control facilities and at Air Route Traffic Control Centers (ARTCCs) apply terminal separation. At certain locations, in-flight specialists at Automated Flight Service Stations (AFSS) relay terminal separation clearances to pilots. Air traffic controllers must constantly scan radar data and flight data to determine aircraft position, perform traffic planning and resolve conflicts. This constant scanning allows the controller to provide initial departure clearances to aircraft that are conflict-free. This knowledge allows the controller to provide timely radar handoffs, traffic advisories, radar point-outs, and communication transfer. The controller also uses scanning to monitor compliance with clearances already delivered. The airspace around an airport with an operating control tower is designated a "terminal area" and is designated one of several classes, based on its complexity and volume of traffic. The areas are Class B, Class C, or Class D. Each class can have different air traffic separation standards, aircraft equipment requirements, and pilot responsibilities. Aircraft are designated as large, small, or heavy based on their weight. Due to turbulence caused by an aircraft passing through the air, separation standards are applied to pairs of aircraft base upon their size. This separation standard takes precedent over the requirements of other separation rules.

Separation

Terminal separation rules apply to the separation of aircraft from aircraft, aircraft from terrain, and aircraft from adjacent protected airspace. Terminal separation of Instrument Flight Rules (IFR) aircraft consists of one or a combination of radar, non radar, and/or visual separation. Radar separation is the preferred method; however, controllers are trained to apply the type of separation that will provide the greatest operational advantage. Radar separation standards are based on the equipment adaptation (single radar site or multiple radar sites), the distance of aircraft from the radar antenna site, and the aircraft size. Radar vectors are used extensively in the terminal areas to manage large volumes of air traffic. The general terminal separation standard is 3 nautical miles (NM) between aircraft at the same altitude.

Non radar separation procedures are based on rules developed before the use of radar. Non radar separation requires more radio communications from pilots to controllers to report route and altitude data. This type of separation is still used in areas with no radar coverage and during radar failures. Non radar separation can be vertical, longitudinal, or lateral. Vertical separation is applied by assigning different altitudes 1,000 feet apart to a pair of aircraft at or below Flight Level (FL) 290. Above FL 290, the standard increases to 2,000 feet apart. Controllers assign an aircraft to an altitude after the aircraft previously at that altitude has reported leaving that altitude. As a general rule, aircraft flying south or west are assigned even cardinal altitudes and aircraft flying north or east are assigned odd cardinal altitudes. Longitudinal separation seeks to ensure that not more than one aircraft can be in the same geographic location at the same time and at the same altitude. Longitudinal separation can be applied to aircraft on the same converging or crossing courses. This type of separation can use the speed difference between the aircraft and can be expressed in miles or in minutes from a fix or airport. Lateral separation is applied by assigning different routings or holding patterns, which do not overlap, to a pair of aircraft. Lateral separation can also be applied to departing aircraft using diverging headings. Visual separation is a clearance from the controller to the pilot that allows the pilot to visually separate his/her aircraft from another aircraft below FL180. The reported weather in the vicinity must be good enough for the pilot to maintain visual contact with the other aircraft. In Class B and Class C terminal airspace, aircraft flying under Visual Flight Rules (VFR) are required to be in contact with air traffic control and are provided separation services. The separation minima in these types of airspace are generally less between IFR and VFR aircraft than that required between two IFR aircraft. In Class D terminal, airspace VFR pilots are required to be in contact with air traffic control, but do not receive separation services.

Letters of Agreement and Local Procedures

Letters of Agreement between adjacent facilities, and local procedures, in Standard Operating Procedures within a facility, can modify terminal separation standards. These letters and procedures cannot reduce separation standards as developed and published at the national level; however, they can increase the standards. These letters and procedures are generally used to ensure that controllers have an understanding of what to expect from aircraft coming from an adjacent facility or from an adjacent controller within their own facility.

Standards

Separation standards are published rules that must be followed and maintained. As prescribed by Federal Aviation Administration directives, terminal separation standards are taught to both en route and terminal controllers. The task of obtaining the required separation may require innovation; and once obtained, it must be maintained. There are several times in each flight when a change from one type of separation standard to another must be accomplished. The change can be a result of transitioning from one type of airspace to another, encountering aircraft of different sizes, or transitioning routes and/or altitudes. Various techniques used by air traffic controllers can have an effect on the application of terminal separation. Proper application of separation standards can increase capacity of the National Airspace System (NAS) without changing the separation standard. Technique in this case is the manner in which the controller achieves and maintains the terminal separation required. This can be controller-specific, but more often is facility-specific. Technique is sometimes changed as new separation standards are issued, traffic increases/decreases, or the evaluation of techniques mandates.

Flight Data

Certain information about each aircraft and its intended flight plan are required to provide terminal separation. The aircraft's call sign and flight number or the aircraft's registration number is required to communicate separation clearances to the flight. The type of aircraft is required information because certain terminal separation standards change based on the size of the aircraft. Routes of flight and altitude information are necessary when applying lateral or vertical terminal separation. Estimated times over navigational fixes are required for non radar separation. Flight data necessary to provide terminal separation originates with the pilot or the pilot's company. This flight data is generally in the form a Federal Aviation Administration (FAA) flight plan. The flight data enters the NAS computer systems through AFSSs, military base operations (BASOPS), Direct User Access Terminal System, , commercial vendors on the Internet, Air carrier, or Air taxi Operations Centers (AOC), pre filed flight plans, or directly from an FAA facility that has direct access to the NAS computer system. This flight data is provided by automated means to most terminal facilities via Flight Data Input/Output (FDIO) devices. The FDIO receives its data from the Host/oceanic computer system replacement (HOCSR) located in the host ARTCC. Flight data information can also be provided to terminal facilities by non automated means using interphone, teletype, fax, telephone, or air/ground (A/G) radios. For example, flight data on an arrival is passed via interphone from the ARTCC to a terminal facility that does not have FDIO equipment.

Radar

Flight data and radar data used to provide separation services between aircraft and airspace are obtained from various FAA automated systems and include primary and backup systems. Radar data is presented to the controller on Automated Radar Terminal System, Display System Replacement, and Standard Terminal Automation Replacement System displays. The radar system being used and/or the distance from the radar site that an aircraft is located can determine terminal separation standards. Most terminal areas use a single-site radar system located on the primary airport. Some large terminal areas have two radar sites that can be manually switched between the two to give the best coverage for a specific area of the airspace. Very large terminal areas sometimes have multiple radar sites. If automation is not available, due to system failure or at non automated facilities, manual procedures are available to provide separation services.

The radar separation standard of 3 NM can only be applied if the separation is within 40 NM of the radar site that is displaying the radar targets. Outside the 40-mile limit, the separation standard increases to five nautical miles. Under certain circumstances (normally a terminal radar outage), en route radar data is sent to terminal facilities and is used as the only radar source. This process is called Center Radar Arts Presentation (CENRAP). If this radar information from the en route environment is adapted to process the best target data available from more than one radar site (mosaic radar adaptation), the separation standard is 5 NM. En route automation can be adapted to provide single radar site coverage. This is often advantageous to terminal facilities in using CENRAP as they can continue to use the 3-NM separation standard within 40 NM of the radar site.

Air/Ground Communications

The FAA uses various types of telecommunications switches to provide both air/ground and ground/ground communications. Generally, these switches are FAA owned and have backup systems case the primary system fails. Commercial telephone systems are sometimes used at non towered airports. Use of cell phones is increasing, primarily in communications failure events. Direct A/G communications are not required to provide terminal separation standards at all times. Arriving aircraft with malfunctioning radio equipment can receive clearance information by light-gun signals from the control tower. Departing aircraft that have radio malfunctions that cannot be repaired can receive departure approval via telephone from the control tower and subsequent clearances by light-gun signals.

Direct radio communications between pilots and controllers are required to use certain terminal separation standards. Visual separation requires the controller to be in direct radio contact with at least one of the pilots of aircraft being authorized to apply visual separation standards. Direct pilot/controller communications are required to use the reduced separation standards afforded by simultaneous Instrument Landing System procedures. In certain instances, direct radio communications between the controller and the pilot are not possible. Then, information and clearances can be relayed via an AFSS, AOC, BASOPS, or over the voice capability of a Very High Frequency Omni directional Range (VOR) or VOR Tactical Air Navigation System. Certain repetitive-type messages, like the weather and the active runway(s), are broadcast over the Automatic Terminal Information Service.

Weather and Airport Information

The controller and the pilot require current weather information to determine the separation standards applied to aircraft and the type of approach an aircraft can fly. This approach determines sequencing separation from a previous or subsequent arrival. The airport condition can change how terminal separation standards are applied. Closed runways and taxiways can increase the interval between subsequent arrivals. These closures can also impact departures. Equipment outages and runway breaking actions can impact the application of separation standards. Noise abatement procedures and capacity can impact separation standard application at certain airports. Weather information comes from on field sensors and from the National Weather Service meteorologists in the Center Weather Service Unit. Airport information generally comes from the airport sponsor. These data can be posted to the controller on the Systems Atlanta Information Display System. At some facilities, this data is posted via flight progress strips or as written data on a tablet.

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |

ID / Revision: 69 / 2

---

Identifier: 102136

Name: Reduced Oceanic Separation and Enhanced Procedures

Description: Availability of user preferred oceanic profiles is increased through reduction of aircraft to aircraft longitudinal, lateral, and horizontal spacing between aircraft that meet required total system performance capabilities including, enhanced communication, surveillance, and flight deck avionics.

Longitudinal and lateral spacing between aircraft conducting oceanic pair-wise altitude change maneuvers (in-trail climbs and descents), is reduced to 10 miles, with ground-based separation responsibility. Horizontal spacing between aircraft conducting oceanic pair-wise co-altitude maneuvers, such as passing a similar-speed aircraft, is reduced to below 30 miles, with ground-based separation responsibility. Communications between aircraft, and between the aircraft and the air navigation service provider (ANSP), enable real-time control instructions by the ANSP and aircraft-to-aircraft delegation of separation authority. Accurate and immediate feedback of routing or altitude changes provides immediate acknowledgement for separation assurance, trajectory changes, and deviations around air traffic or weather. This may be implemented using either 1) Automatic Dependent Surveillance-Contract (ADS-C) and satellite-based communication, or 2) Automatic Dependent Surveillance-Broadcast (ADS-B), on-board displays and algorithms, and satellite-based communications.

Benefits: ·Increased safety
·Increased capacity
·Enhanced efficiency

Time Frame: Far Term

Earliest IOC - Latest IOC: 2019 - 2025

Solution Set(s): Initiate Trajectory Based Operations

Service: ATC-Separation Assurance

Capability: Aircraft to Aircraft Separation Capability

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 23-Mar-2010 by David Bartlett

ID / Revision: 62 / 7

---

Identifier: 102137

Name: Automation Support for Separation Management

Description: The ANSP automation provides the controller with tools to manage aircraft separation in a mixed navigation and wake performance environment. Aircraft with various operating and performance characteristics will be operating within the same volume of airspace. Controllers will use ANSP automation enhancements to provide situational awareness of aircraft with differing performance capabilities (e.g., delegated self-separation maneuvers, equipped vs. non-equipped aircraft, RNAV, RNP, and trajectory flight data management). For example in performance-based navigation, RNAV/RNP routes may be spaced closer than the normally required separation for the sector area. The standard system conflict alert and conflict probe for the designated area account for this reduced spacing. These enhancements enable ANSP to manage the anticipated increase in complexity and volume of air traffic

Benefits: Improved efficiency
Enhanced safety
Enhanced situational awareness

Time Frame: Mid Term

Earliest IOC - Latest IOC: 2014 - 2015

Solution Set(s): Initiate Trajectory Based Operations

Service: ATC-Separation Assurance

Capability: Aircraft to Aircraft Separation Capability

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 26-Apr-2010 by David Bartlett

ID / Revision: 60 / 9

---

Identifier: 102138

Name: Expanded Radar-like Services to Secondary Airports

Description: Expanded capacity is available in Instrument Meteorological Conditions (IMC) at additional secondary airports. Expanded delivery of radar-like coverage with surveillance alternatives such as Automatic Dependent Surveillance-Broadcast (ADS-B) coverage, combined with other radar sources, and with an expansion of communication coverage provides equipped aircraft with radar-like services to secondary airports.

Equipped aircraft automatically receive airborne broadcast traffic information. Surface traffic information is also available at select non-towered satellite airports.

Enhanced surveillance coverage in areas of mountainous terrain where radar coverage is limited, especially to small airports, enables ANSP to provide radar-like services to equipped aircraft. This capability enhances alerting and emergency services beyond normal radar coverage areas.

Benefits: ·Improved safety
·Expanded ANSP services
·Enhanced surveillance coverage
·Enhanced search and rescue coordination

Time Frame: Far Term

Earliest IOC - Latest IOC: 2016 - 2020

Solution Set(s): Increase Flexibility in the Terminal Environment

Service: ATC-Separation Assurance

Capability: Aircraft to Aircraft Separation Capability

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 23-Mar-2010 by David Bartlett

ID / Revision: 45 / 7

---

Identifier: 102140

Name: Wake Turbulence Mitigation for Departures (WTMD): Wind-Based Wake Procedures

Description: Changes to wake rules are implemented based on wind measurements. Procedures allow more closely spaced departure operations to maintain airport/runway capacity.

Procedures are developed at applicable locations based on the results of analysis of wake measurements and safety analysis using wake modeling and visualization. During peak demand periods, these procedures allow airports to maintain airport departure throughput during favorable wind conditions.

A staged implementation of changes in procedures and standards, as well as the implementation of new technology will safely reduce the impact of wake vortices on operations. This reduction applies to specific types of aircraft and is based on wind transporting an aircraft's wake away from the parallel runway's operating area.

Benefits:
*Improved efficiency
*Increased capacity
*Reduced fuel-burn and engine emissions

Time Frame: Mid Term

Earliest IOC - Latest IOC: 2011 - 2016

Solution Set(s): Increase Flexibility in the Terminal Environment

Service: ATC-Separation Assurance

Capability: Aircraft to Aircraft Separation Capability

Lead Organization: Integration Managers Group - AJP-A3

| | |
|---|---|
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 59 / 7 |

---

| | |
|---|---|
| Identifier: | 102141 |
| Name: | Improved Parallel Runway Operations |
| Description: | The improvement will explore concepts to recover lost capacity through reduced separation standards, increased applications of dependent and independent operations, enabled operations in lower visibility conditions, and changes in separation responsibility between the ATC and the flight deck.<br><br>This improvement will develop improved procedures that enable operations for closely spaced parallel runways (runways spaced less than 4300 feet laterally) in reduced visibility weather conditions. This operational improvement promotes a coordinated implementation of policies, technologies, standards and procedures to meet the requirement for increased capacity while meeting safety, security, and environmental goals.<br><br>Intermediate concepts for maintaining access to parallel runways continue to be explored (e.g., use of RNP approaches to define parallel approaches with adequate spacing; RNP transition to an ILS final approach course; RNP/LAAS/WAAS; Wake Program Office initiatives).<br><br>Research will be initiated to and continued to support far-term capacity requirements. Research will be focused on finding ways to recover lost capacity due to IMC events by providing a monitoring capability that mimics or replaces visual separation. This improvement allows additional reduction of lateral spacing for arrivals. VMC-like capacity may be achieved by integrating new aircraft technologies such as ADS-B in, precision navigation, data communications and cockpit displays. Additionally, research will be focused on finding ways to recover lost capacity due to IMC events by updating standards and terminal instrument procedures by taking advantage of systems with advanced navigation accuracy such as WAAS and LAAS and advanced surveillance capabilities such as multilateration Precision Runway Monitor-Alternate (PRM-A) and eventually Automatic Dependent Surveillance Broadcast (ADS-B). |
| Benefits: | *Improved efficiency<br>*Increased capacity<br>*Decreased user operational costs<br>*Reduced fuel-burn and engine emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2012 - 2018 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 51 / 7 |

| | |
|---|---|
| Identifier: | 102142 |
| Name: | Efficient Metroplex Merging and Spacing |
| Description: | Air navigation service provider (ANSP) automation and decision support tools incorporate aircraft wake characteristics and forecast wake transport conditions. Spacing buffers between streams approaching and departing multiple metroplex runways are reduced to allow efficient airborne merging and spacing, increasing greater traffic throughput and reduced ANSP workload in terminal areas.<br><br>Arrival and departure flows are planned and executed based on a comprehensive view of real time airport operations. Automation provides optimal departure staging and arrival sequencing based on aircraft wake, wake conditions and airborne performance characteristics. Data communications provides required navigation performance routes to the flight deck. This OI includes development of ANSP capability and procedures and requires an Implementation Decision to determine what complex airborne merging and spacing operations will be required for effective use of high-density metroplex airspace, such as crossing streams, merging and diverging streams, etc. |
| Benefits: | ·Enhanced efficiency<br>·Decreased fuel burn, emissions, and noise |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2020 - 2024 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Jan-2010 by David Bartlett |
| ID / Revision: | 50 / 5 |

| | |
|---|---|
| Identifier: | 102143 |
| Name: | Delegated Responsibility for Horizontal Separation (Lateral and Longitudinal) |
| Description: | Enhanced surveillance and new procedures enable the ANSP to delegate some responsibility for maintaining aircraft-to-aircraft separation to flight crews. Improved display avionics and broadcast positional data provide detailed traffic situational awareness to the flight deck. When authorized by the controller, pilots will implement delegated separation between equipped aircraft using established procedures to achieve more consistent and predictable aircraft spacing. This spacing will more accurately apply existing separation standards, in various meteorological conditions, while at the same time reducing controller workload.<br><br>Broadcast surveillance sources and improved avionics capabilities provide ANSP and the flight deck with accurate position and trajectory data and therefore increased situational awareness. Aircraft that are equipped to receive the broadcasts and have the associated displays, avionics, and crew training will perform delegated separation when authorized by the controller. |

During specific meteorological conditions and/or air traffic procedures, delegated separation operations include the transfer of separation authority for a specific maneuver to achieve improved NAS capacity and flight efficiency. For example, during Instrument Meteorological Conditions (IMC), the additional situational awareness on the flight deck provided by displays of proximate traffic enable aircraft to accept some separation responsibility without adding a separation buffer to the 3 NM separation standard. During certain marginal conditions in the terminal area, this procedure enables aircraft to continue with the Visual Meteorological Conditions separation instead of decreasing capacity by switching to much lower capacity IFR operations. Under this procedure, aircraft that have established initial visual contact can continue a visual approach while traversing a light cloud layer, using the onboard traffic display briefly to augment situational awareness until visual contact is reestablished.

Aircraft performing delegated separation procedures are paired and separate themselves from one another by maintaining a given time or distance from a designated aircraft using cockpit-based tools. The use of this procedure will replace some of the ATC vectoring and speed instructions made necessary by existing surveillance. For aircraft not delegated separation authority, ANSP automation will still support separation.

| | |
|---|---|
| Benefits: | *Improved efficiency<br>*Increased capacity |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2015 - 2022 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 55 / 7 |

---

| | |
|---|---|
| Identifier: | 102144 |
| Name: | Wake Turbulence Mitigation for Arrivals: CSPRs |

Description:

Initially, dependent separation between aircraft on parallel approach courses to Closely Spaced Parallel Runways (CSPRs) will be procedurally reduced in IMC in all crosswind conditions to something less than today's wake separation behind Heavy or B757 aircraft based on a safety analysis of the airport geometry, local meteorology and other factors at each airport. Further separation reduction will be permitted down to radar minima for dependent approaches (1.5 nm stagger) using wind sensing and prediction systems to determine when crosswinds are sufficiently stable and strong enough that wake turbulence drift and decay will ensure safe separation reduction. A decision support aid will indicate to the controller when stable crosswinds (both measured and predicted) will ensure that the upwind approach is safe from wakes generated from Heavy or B757 aircraft on the downwind approach.

Changes to wake separation minima are implemented based on measured and predicted airport area winds. Supporting procedures, developed at applicable locations based on analysis of wake measurements and safety, allow more closely spaced arrival operations increasing airport/runway capacity in IMC. During peak demand periods, these procedures allow airports to increase airport arrival throughput during IMC and favorable wind conditions. Implementation of changes in procedures and standards, as well as the implementation of new technology, will safely reduce the impact of wake vortices on airport IMC arrival operations. The achieved separation reduction will depend on the specific lead/trail aircraft pair when crosswinds are taken into account, and could default to the radar minima of 1.5 NM stagger based on wind blowing an aircraft's wake away from the parallel runway's operating area.

Crosswind dependent wake-based arrival procedures at specific airports will be deployed with corresponding operating periods. As technology matures and further study provides more detail and accuracy for wake turbulence drift and decay predictions, the amount of time that reduced wake separation procedures will be available will increase.

| | |
|---|---|
| Benefits: | Increased capacity<br>Improved efficiency |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2015 - 2018 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 27-Jan-2010 by Charles Horne |
| ID / Revision: | 54 / 5 |

---

| | |
|---|---|
| Identifier: | 102145 |
| Name: | Single Runway Arrival Wake Mitigation |
| Description: | Single Runway Arrival Wake Mitigation will provide increased arrival capacity to single runways by reducing longitudinal wake separation standards for IFR operations under certain crosswind conditions. Weather sensors and products will be used to monitor crosswind conditions, and air traffic automation systems will be used to indicate to controllers when they can safely reduce wake separation standards, increasing arrival capacity. |
| Benefits: | *Increased capacity<br>*Improved efficiency |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2020 - 2023 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |

| | |
|---|---|
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 27-Apr-2010 by David Bartlett |
| ID / Revision: | 53 / 7 |

---

| | |
|---|---|
| Identifier: | 102146 |
| Name: | Flexible Routing |
| Description: | Leveraging enhanced flight capabilities based on Required Navigation Performance, flight operators can operate along preferred and dynamic flight trajectories based on an optimized and economical route for a specific flight, accommodating user preferred flight trajectories.<br><br>Aircraft may execute a desired route using existing, fixed waypoints or other route coordinates, which may have some flexibility in time and space dimensions "window." Aircraft may coordinate a route change with ANSP at any time through data or voice communications (air-ground data exchange); however, minor changes of the route within the tolerances of the "window" are allowed and do not require coordination with the ANSP. ANSP uses ground-based decision support tools to maintain separation responsibility for aircraft. The result of this OI optimizes available airspace, allowing flight operators more flexible routings to reduce block time and fuel burn. ANSP may require flight operators to fly within designated route structures for congestion management, as needed.<br><br>Increased system precision and enhanced automation supports the efficient use of flight levels so that aircraft can more closely fly routes that maximize the airlines' goals of fuel efficiency, aircraft operations, and schedule. Aircraft provide state and intent data that will lead to fewer predicted problems, and as a result, fewer diversions from the preferred routing. Reduced separation standards will also result in increased capacity within flow constrained airspace, allowing more aircraft to fly through those areas, rather than being rerouted or delayed to avoid them. |
| Benefits: | Increased efficiency<br>Reduced fuel burn |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2019 - 2023 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Jan-2010 by David Bartlett |
| ID / Revision: | 56 / 5 |

---

| | |
|---|---|
| Identifier: | 102147 |
| Name: | Self-Separation Airspace - Oceanic |
| Description: | Oceanic user efficiency and Air Navigation Service Provider (ANSP) productivity are improved through self-separation operations in designated oceanic airspace for capable aircraft.<br><br>Aircraft fly preferred optimum profiles without coordination with ANSP. Aircraft-to-aircraft separation is delegated to the flight deck in designated airspace for capable aircraft with Automatic Dependent Surveillance-Broadcast (ADS-B) and onboard conflict detection and alerting. The separation minima are reduced to a level that maintains appropriate margins of safety. Prior to an established point or designated timeframe, aircraft coordinate with ANSP to receive a clearance to exit self-separation airspace. |
| Benefits: | Increased efficiency |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2022 - 2025 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Joint Planning and Development Office - AJP-C |
| Update Date: | 16-Feb-2010 by David Bartlett |
| ID / Revision: | 61 / 6 |

| | |
|---|---|
| Identifier: | 102148 |
| Name: | Self-Separation Airspace Operations |
| Description: | In self-separation airspace, capable aircraft, equipped with Automatic Dependent Surveillance-Broadcast (ADS- B) and onboard conflict detection and alerting, are responsible for separating themselves from one another, and the Air Navigation Service Provider (ANSP) provides no separation services, enabling preferred operator routing with increased ANSP productivity.<br><br>Research will determine whether the ANSP will provide any traffic flow management services within self-separation airspace. Aircraft must meet equipage requirements to enter self-separation airspace, including transmission of trajectory intent information through cooperative surveillance. Transition into self-separation airspace includes an explicit hand-off and acceptance of separation responsibility by the aircraft. Transition into ANSP-managed airspace is facilitated through assigned waypoints with Controlled Time of Arrivals (CTAs), allowing the ANSP to sequence and schedule entry into congested airspace, and self-separating aircraft are responsible for meeting assigned CTAs. Self-separating aircraft execute standardized algorithms to detect and provide resolutions to conflicts. Right-of-way rules determine which aircraft should maneuver to maintain separation when a conflict is predicted. Contingency procedures ensure safe separation in the event of failures. |
| Benefits: | Increased efficiency |

| | |
|---|---|
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2022 - 2025 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Joint Planning and Development Office - AJP-C |
| Update Date: | 16-Feb-2010 by David Bartlett |
| ID / Revision: | 48 / 6 |

---

| | |
|---|---|
| Identifier: | 102149 |
| Name: | Delegated Separation - Complex Procedures |
| Description: | In Air Navigation Service Provider (ANSP)-managed airspace, the ANSP delegates separation responsibilities to capable aircraft to improve operator routing, enhance operational efficiency, or increase ANSP productivity.<br><br>This Operational Improvement involves more complex delegated separation responsibilities than those performed using a cockpit display to cross, merge, or pass another aircraft. Using advanced airborne technologies with conflict detection and alerting, aircraft in ANSP-managed En Route and transition airspace are delegated separation responsibilities to perform more complex operations, possibly maintaining separation from more than one other aircraft. The feasibility of using advanced airborne conflict detection and alerting technologies to perform complex procedures under delegated separation responsibility will be determined based on an evaluation of previous delegated separation Operational Improvements. |
| Benefits: | Increased efficiency |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2025 - 2030 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Joint Planning and Development Office - AJP-C |

**Update Date:** 16-Feb-2010 by David Bartlett

**ID / Revision:** 47 / 6

---

**Identifier:** 102150

**Name:** Reduce Separation - High Density Terminal Less Than 3-miles

**Description:** Metroplex airspace capacity is increased through implementing separation procedures for conducting separation with less than 3-miles between arrival and departure routes in a high density environment.

This Operational Improvement increases metroplex airspace capacity and supports super density airport operations. Enhanced surveillance and data processing provides faster update rates to allow reduced separation. Arrival/departure routes with lower Required Navigation Performance (RNP) values (e.g., RNP<1 nm) are defined with less than 3 miles lateral separation between routes, subject to wake vortex constraints, enabling the use of more routes in a given airspace. This may require airborne lateral separation between routes. Enhanced Required Surveillance Performance (RSP) is required, allowing more precise location so that separation can be further reduced. The specific level of RSP will determine to what degree separation can be less that 3 miles. This requires a Policy Decision to determine what RNP values to require based on performance benefit versus equipage requirements and operational considerations. Expected use: high density terminal and transition airspace.

**Benefits:** Increased capacity

**Time Frame:** Far Term

**Earliest IOC - Latest IOC:** 2025 - 2030

**Solution Set(s):** Increase Arrivals/Departures at High Density Airports

**Service:** ATC-Separation Assurance

**Capability:** Aircraft to Aircraft Separation Capability

**Lead Organization:** Integration Managers Group - AJP-A3

**Update Date:** 28-Apr-2010 by David Bartlett

**ID / Revision:** 46 / 7

---

**Identifier:** 102151

**Name:** Single Runway Departure Wake Mitigation

| | |
|---|---|
| Description: | Single Runway Departure Wake Mitigation will provide increased departure capacity from single runways by reducing longitudinal wake separation standards under certain crosswind conditions. Airport weather sensors and products will be used to monitor crosswind conditions, and air traffic automation systems will be used to indicate to controllers when they can safely reduce wake separation standards, increasing departure capacity. |
| Benefits: | Increased capacity |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2018 - 2021 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 27-Apr-2010 by David Bartlett |
| ID / Revision: | 49 / 6 |

---

| | |
|---|---|
| Identifier: | 102152 |
| Name: | Dynamic, Pairwise Wake Turbulence Separation |
| Description: | Wake turbulence separation applications for departure, arrival, and en route operations are integrated into air traffic automation to provide dynamic, pairwise, lateral, longitudinal, and vertical separation requirements for trajectory management based on aircraft and weather conditions, in real time. |
| Benefits: | Increased efficiency |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2024 - 2027 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |

Update Date: 27-Apr-2010 by David Bartlett

ID / Revision: 52 / 6

---

Identifier: 102153

Name: Limited Simultaneous Runway Occupancy

Description: Runway capacity is increased through the allowance of more than one aircraft on the runway, at a given time, for specific situations.

The expected use is to relax some of the present procedures/rules, thereby allowing an aircraft to land while another aircraft is in the process of exiting the runway onto a taxiway, or allowing an aircraft to enter the runway while another aircraft is in the process of departing from that runway.

This OI is not intended to permit simultaneous aircraft operations on the runway, but rather to permit an aircraft to start or end a maneuver while another aircraft is completing a maneuver; only one aircraft may be conducting an actual operation, take off or landing, while the other aircraft is either exiting the runway or getting in position to perform an operation. This OI may require ADS-B in/out for surveillance and pilot situational awareness, such as cockpit display (CDTI), augmented with GPS sensors (WAAS or LAAS) for accurate position, depending on the specific situation and conditions at that time.

Benefits: Increased capacity

Time Frame: Far Term

Earliest IOC - Latest IOC: 2020 - 2023

Solution Set(s): Increase Arrivals/Departures at High Density Airports

Service: ATC-Separation Assurance

Capability: Aircraft to Aircraft Separation Capability

Lead Organization: Joint Planning and Development Office - AJP-C

Update Date: 16-Feb-2010 by David Bartlett

ID / Revision: 44 / 6

---

Identifier: 102154

Name: Wake Re-Categorization

| | |
|---|---|
| Description: | Legacy wake separation categories are updated based on analysis of wake generation, wake decay, and encounter effects for representative aircraft. Eventually, static wake separation standards are established that consider model specific leader-follower aircraft pairings, replacing categorical standards and increasing capacity. Ultimately, dynamic wake separation standards are established that consider real-time atmospheric and aircraft configuration information as well. ANSP automation supports adjustment and application of standards. |
| Benefits: | Improved efficiency<br>Increased capacity<br>Reduced fuel-burn and engine emissions |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2014 - 2022 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft to Aircraft Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Apr-2010 by David Bartlett |
| ID / Revision: | 137 / 4 |

---

| | |
|---|---|
| Identifier: | 102201 |
| Name: | Current Aircraft To Terrain / Obstacle Separation |
| Description: | Aircraft are separated from the ground (terrain) and from obstacles to ensure safe operations. The pilot is responsible for terrain and obstacle separation for aircraft flying Visual Flight Rules (VFR). The controller and the pilot share responsibility for terrain and obstacle separation for aircraft flying Instrument Flight Rules (IFR). For IFR separation, there are procedures for both radar and non radar application. Airspace and approaches are designed to ensure terrain and obstacle separation. Automated systems aboard aircraft and at controller workstations provide alarm when separation is below defined safety criteria.<br><br>The Obstruction Evaluation/Airspace and Airport Analysis system provides automated tools and processes to enable the FAA regions to screen and track the status of over 17,000 obstruction evaluation notices annually, perform airport/airspace analyses, and maintain information on obstructions, airports, air navigation facilities, and communications facilities.<br><br>Flight data and radar data support separation services between aircraft and terrain/obstacles airspace. These are both primary and backup systems. If automation is not available, through system failure or at non automated facilities, manual procedures can be used to provide separation services. Air/ground radio communications are used to relay clearance instructions and amendments to aircraft. Ground/ground communications are used to coordinate airspace status and to relay control instructions through other facilities.<br><br>Separation standards are published rules that must be adhered to and maintained. Vertical separation from terrain and obstacles is 1,000 feet. Over mountainous areas the separation is increased to 2,000 feet. Radar separation is 3 or 5 nautical miles, depending on the distance from the radar site and whether the site is single-source-adapted. The obstruction must be on the radar display to allow the controller to use radar separation. The depiction can be on the map data or can be a transponder attached to the obstruction, which is displayed to the controller as a secondary radar target. |

| | |
|---|---|
| | FAA computer systems that are able to process Mode C radar data have software that alerts the controller to any aircraft that is reported below a minimum safe altitude. Minimum Safe Altitude Warning, En Route Minimum Safe Altitude Warning, and Low Altitude Alert System software give the controller visual alerts when certain parameters are met. Certain aircraft are equipped to receive data from radar altimeters and Global Positioning Satellite receivers. This data provides detection and alert to pilots of low-altitude occurrences. Some aircraft have with a Terrain Awareness and Warning System, which accepts position data from the position calculator function (navigation avionics), detects possible terrain collisions, and sends warning alerts to the flight crew via the aircraft's audio and display systems. |
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft-Terrain-Obstacles |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 71 / 2 |

---

| | |
|---|---|
| Identifier: | 102301 |
| Name: | Current Aircraft To Airspace Separation |
| Description: | This operational improvement provides separation services to ensure that aircraft maintain a safe distance from special use airspace (SUA), such as prohibited, restricted, and warning areas. The SUA ensures safety for unique aircraft operations by prohibiting other flights within a specified area. Separation standards ensure that aircraft remain an appropriate minimum distance from the airspace. The standards are applied using regulatory publications, specific control instructions, and other methods.<br><br>SUA is a designated and charted area depicted on an aeronautical chart as a shaded area. SUA designations include Prohibited, Restricted (R), Warning (W), Military Operations Areas, Controlled, Firing Areas (CFAs), and Alert Areas (A). They are named (i.e., R-4305) and identified by location through charting and geographical coordinates and altitude (floor and ceiling). Some SUAs are activated and then deactivated when not needed for unique operations. Special Use Airspace is designed and procedures are written to ensure safe clearance for all aircraft at all times. SUAs are identified to pilots through Notices to Airmen (NOTAM) and charting and to controllers by designation on radar and chart depictions to assist aircraft in avoiding the SUA. In addition to "fixed" airspace, there are "moving" SUAs or Altitude Reservation Temporary Flight Restrictions (TFR).<br><br>TFRs are approved and issued by the FAA to restrict flight activity in the area described in the TFR announcement, issued in the (NOTAM). CFR 14, Part 91, specifies the operations that are prohibited, restricted, or allowed in the TFR area. A TFR applies to a specific hazard or condition with multiple objectives: to provide a safe environment for rescue/relief operations; assist in declared national disasters; protect the President, Vice President, or other public figures; provide a safe environment for space agency operations; and to prevent unsafe congestion of sightseeing or other aircraft above an incident or event. A TFR may also be an area approved by the FAA for use by another requesting Federal agency, such as the Department of the Interior in dealing with forest fires. More recently, TFRs are being established for security purposes and are evolving into Continental U.S. Air Defense Identification Zones. |

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | ATC-Separation Assurance |
| Capability: | Aircraft Airspace Capability |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 15 / 2 |

---

| | |
|---|---|
| Identifier: | 102401 |
| Name: | Current Surface Separation |
| Description: | The fundamental purpose of surface separation is to move aircraft safely and efficiently on the airport surface onto active runways and taxiways. Separating aircraft on the airport surface is a shared responsibility. The pilot visually separates aircraft on taxiways with help from the ground controller. Air traffic controllers provide airport traffic control service based only on observed or known traffic and airport conditions. At some airports, controllers provide preventive control service only to aircraft operating under a letter of agreement. Controllers issue advice or instructions only if a situation develops that requires corrective action.<br><br>For their part, pilots and vehicle operators use visual cues to operate on and around the airport surface. They are also affected by visual line-of-sight restrictions and fog or heavy precipitation. Some cues include approach landing and taxi/edge lighting systems, airport signs, and lines painted on the runway/taxiway surface for guidance. Pilots and vehicle operators also use other aircraft's lights (tail, wing, and landing lights), radio communications, and standard taxi routes/airport diagrams to help reduce confusion.<br><br>Local control and ground control responsibilities include controlling aircraft exiting the runway after touchdown, granting taxi clearance for arrivals and departures, controlling vehicles operating on or crossing taxiways and runways, holding aircraft for departure or for an available gate, granting takeoff clearances, ensuring runway clearance for runway operations, and providing taxiway flow management. Controllers use visual surveillance of controlled aircraft whenever possible. Visual surveillance of aircraft and vehicles is augmented at some high-activity airports by airport surface detection radar displays such as Airport Surface Detection Equipment (ASDE) with Airport Movement Area Safety System (AMASS). AMASS processes surveillance data from the terminal automation system and the ASDE-3 radar to determine the position and velocity of aircraft and vehicles on the airport surface. AMASS also alerts the air traffic controller of potential conflicts between arriving aircraft and vehicles on the surface and among surface traffic. AMASS accomplishes this by comparing the tracks of aircraft on final approach with the movement of vehicles and aircraft on the airport as detected by the ASDE-3. Also at night and during periods of restricted visibility, controllers rely on procedural techniques such as issuing clearance limits and using pilot and vehicle operator position reports. |
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |

| | |
|---|---|
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | ATC-Separation Assurance |
| Capability: | Surface Separation Capability |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 76 / 2 |

---

| | |
|---|---|
| Identifier: | 102406 |
| Name: | Provide Full Surface Situation Information |
| Description: | Automated broadcast of aircraft and vehicle position to ground and aircraft sensors/receivers provides a digital display of the airport environment. Aircraft and vehicles are identified and tracked to provide a full comprehensive picture of the surface environment to ANSP, equipped aircraft, and flight operations centers (FOCs).<br><br>Surface Situation Information will complement visual observation of the airport surface. Decision support system algorithms will use enhanced target data to support identification and alerting of those aircraft at risk of runway incursion.<br>In addition, non-ANSP functions, such as airport (movement and non-movement areas) and security operations will benefit from information exchange and situational awareness of aircraft and equipped vehicle surface position and movement. |
| Benefits: | *Improved safety<br>*Improved efficiency<br>*Increased situational awareness |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2016 - 2019 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | ATC-Separation Assurance |
| Capability: | Surface Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 27-Jan-2010 by Charles Horne |

| | |
|---|---|
| ID / Revision: | 74 / 6 |

---

| | |
|---|---|
| Identifier: | 102409 |
| Name: | Provide Surface Situation to Pilots, Service Providers and Vehicle Operators for Near-Zero-Visibility Surface Operations |
| Description: | Aircraft and surface vehicle positions are displayed to aircraft, vehicle operators, and air navigation service providers (ANSP) to provide situational awareness in restricted visibility conditions, increasing efficiency of surface movement.<br><br>Surface movement is guided by technology such as moving map displays, enhanced vision sensors, synthetic vision systems, Ground Support Equipment and a Cooperative Surveillance System. Aircraft and surface vehicle position will be sensed and communicated utilizing systems such as Cockpit Display of Traffic Information (CDTI) and Automatic Dependent Surveillance-Broadcast (ADS-B). Efficient management of surface movement requires cooperative surveillance (i.e., ADS-B out) for all aircraft and ground vehicles present. |
| Benefits: | ·Improved situational awareness<br>·Enhanced safety<br>·Enhanced efficiency |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2015 - 2025 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | ATC-Separation Assurance |
| Capability: | Surface Separation Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Jan-2010 by David Bartlett |
| ID / Revision: | 75 / 5 |

---

| | |
|---|---|
| Identifier: | 103101 |
| Name: | Current Terminal Advisory - Weather |

Description: Terminal controllers ensure that pilots under their control are alerted to potentially aviation-impacting weather, including in-flight icing, wind shear, turbulence, hail, lightning, tornadoes, areas of low visibility, and heavy precipitation. To aid controllers in providing weather advisories, the FAA provides them with a variety of weather information from both FAA and tri-agency (FAA, NWS, DoD) weather sensors and processors, as well as aviation weather products from the National Weather Service (NWS). In addition, controllers receive procedures and phraseology to facilitate this task. Terminal controllers receive numerous text products of routine weather such as surface observations from the airport ASOS as well as Terminal Aerodrome Forecasts (TAFs) and Area Forecasts (FAs) from the NWS weather forecast offices. They also receive products (along with alerts) from FAA airport wind shear/microburst systems (i.e., the Terminal Doppler Weather Radar (TDWR), Low Level Wind shear Alert System (LLWAS), and the Weather System Processor (WSP)).

Other text-based weather products received include convective Significant Meteorological Information (SIGMETs) from the Aviation Weather Center (AWC) and Center Weather Advisories (CWA) and Meteorological Impact Statements (MIS) from the Center Weather Service Unit (CWSU) at the nearest Air Route Traffic Control Center (ARTCC). At NAS pacing airports, TDWR also provides a gust-front detection and predictive capability that relates gust-front position, plus 10- and 20-minute forecasted positions. This enables controllers to rearrange arriving/departing air traffic for expected wind shifts, increasing landings and takeoffs as well as surface movement, thereby increasing airport acceptance rates during thunderstorm passage. Facility personnel review weather products to determine the geographical extent and potential operational impact of hazardous weather. Controllers must disseminate weather alerts based on the potential impact in their sector or area of control jurisdiction. Tower cab and approach control facility personnel may opt to broadcast hazardous weather information alerts only when any part of the area described is within 50 nautical miles of the airspace under their jurisdiction. Controllers within commissioned Hazardous In-flight Weather Advisory Service (HIWAS) areas broadcast HIWAS alerts on all frequencies, except emergency frequencies. The HIWAS is continuously recorded and provides broadcasts of weather hazards to airborne pilots over selected very high frequency omnidirectional range services. Controllers outside of commissioned HIWAS areas advise pilots of the availability of hazardous weather advisories. Pilots requesting additional information are told to contact the nearest En Route Flight Advisory Service position (sometimes called Flight Watch) at an Automated Flight Service Station (AFSS).

Wind Shear/Microburst Warnings

The FAA employs an integrated plan for wind shear coverage that significantly improves both the safety and capacity of the majority of the airports currently served by air carriers. This plan integrates several programs, including the Integrated Terminal Weather System (ITWS), TDWR, WSP, and LLWAS, comprising a single strategic concept that significantly improves the availability of wind shear/microburst information at over 100 of the busiest NAS airports.

Wind shear/microburst warnings from the above systems are displayed in the tower cab and the terminal radar approach control (TRACON) facility. These warnings can be integrated in an information display system or on their own display. Regardless of the system, these wind shear/microburst warnings are displayed textually in a standardized format so that the controller does not have to interpret the data, but simply reads the information to the pilot. To ensure that hazardous weather events are disseminated in a timely manner to the pilot, the controller constantly monitors these displays. Below is an example of what the controller sees on the displays in the tower cab for a Microburst Alert: 27A MBA 35K-2MF 250 20 The phraseology for issuing this alert to a pilot would be: RUNWAY 27 ARRIVAL, MICROBURST ALERT, 35 KT LOSS 2 MILE FINAL, THRESHOLD WIND IS 250 AT 20 KNOTS. In plain language, the controller is telling the pilot that there is a microburst alert on the approach course to runway 27, and to expect a 35-knot loss of airspeed at about 2 miles out on final approach (where the aircraft will first encounter the effects of the microburst). Thus, the aircrew is forewarned and prepared to apply wind shear/microburst escape procedures should they decide to continue the approach. Also included is a statement that the surface winds for landing on runway 27 are reported as 250 degrees at 20 knots. The controller uses the tower communications system to advise pilots of aviation-impacting weather conditions in/around the airport and to receive Pilot Reports (PIREPs). Local weather conditions, whether hazardous or of a routine nature, are also disseminated via the Digital Automatic Terminal Information Service. With its implementation in 2002, ITWS will become the primary source of integrated weather information at 47 of the busiest NAS terminals impacted by weather. With the integration of data and products from various FAA and NWS sensors, even airborne weather observations, ITWS-generated products will include wind shear and microburst predictions, storm cell and lightning information, data on terminal area winds up to 18kft, runway winds, and gust front location and predicted movement. These products will be integrated onto the Terminal Controller Workstation (TCW) and Tower Display Workstation (TDW), which that are also capable of displaying six distinct levels of precipitation intensity (identified by different colors) simultaneously with air traffic, This allows controllers to advise and/or reroute aircraft around heavy precipitation or severe weather conditions. To enhance common situational awareness of hazardous weather impacting pacing airports, the FAA implemented the Terminal Weather Information for Pilots (TWIP) program. TWIP assists in alerting pilots of to hazardous weather in the terminal area by integrating weather and communications technology to efficiently transmit a crude graphical depiction of wind shear/microburst weather events occurring at the busiest NAS airports to properly-equipped cockpits. TWIP transmits automated alerts of wind shear/microburst activity from the TDWR to the cockpit via the Addressing, Communications and Reporting System (ACARS) service provider. The information is sent via an ACARS data link to the jetliner cockpit via the Airport Operations Center (AOC). Current convective weather advisory services from TWIP also include information on precipitation intensity levels and gust fronts at the airport.

PIREP Information.

The NAS depends upon the pilot to augment weather information derived from the FAA and NWS sources. Sophisticated cockpit avionics not only assist the pilot in avoiding convective weather, but also in reporting it to other NAS users via PIREPs. PIREP information includes: reports of strong frontal activity, squall lines, thunderstorms, light to severe icing, wind shear and turbulence (including clear air turbulence (CAT)) of moderate or greater intensity, volcanic eruptions/ash clouds, and other conditions affecting safety of flight.

Benefits: Current operations are provided in the NAS.

Time Frame: As Implemented

| | |
|---|---|
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | ATC-Advisory |
| Capability: | Weather Advisories Capability |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 11 / 2 |

---

| | |
|---|---|
| Identifier: | 103104 |
| Name: | Deploy FIS-B Nationally |
| Description: | Flight Information Service-Broadcast (FIS-B) is deployed to provide weather services on the airport surface, in terminal and en route airspace to equipped aircraft.  FIS-B improves flight deck situational awareness relative to weather and reduces frequency congestion.  The air navigation service provider (ANSP) provides weather advisories to unequipped aircraft via other means.<br><br>The FIS-B weather processors generate graphical and textual products for broadcast to equipped aircraft in coverage areas.  FIS-B products include precipitation, convective activity, in-flight icing, low-ceiling/visibility maps, turbulence information, and site-specific weather reports and forecasts.<br><br>Aircraft receive continually updated weather information, enabling rapid notification (automation-to-automation) of changing weather conditions.  Weather data communications to the flight deck include both "publish" and "subscribe" dissemination of critical hazardous weather information.  Aircraft may request ("subscribe to") specific weather information impacting their flight, while broad area weather advisories and warnings are issued ("published") to all affected aircraft when safety-critical changes occur.  Only properly equipped aircraft (e.g. UAT-equipped, but NOT 1090-equipped) will have access to the information broadcast. |
| Benefits: | ·Enhanced efficiency<br>·Enhanced safety<br>·Reduced frequency congestion |
| Time Frame: | Near Term |
| Earliest IOC - Latest IOC: | 2009 - 2013 |
| Solution Set(s): | Reduce Weather Impact |
| Service: | ATC-Advisory |
| Capability: | Weather Advisories Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |

Update Date: 28-Apr-2010 by David Bartlett

ID / Revision: 9 / 6

---

Identifier: 103107

Name: Current En Route Advisory - Weather

Description: Air Traffic Control (ATC) advisory - weather data goes to multiple en route decision makers. These data consist of observations of the current state of the atmosphere and forecasts. Observations may contain information relating hazardous (aviation-impacting) conditions or of routine weather (i.e., a surface observation on a good day). Similarly, forecasts may contain only routine weather (e.g., a Terminal Aerodrome Forecast (TAF) relating that no thunderstorms or adverse weather is expected). A TAF can contain both routine and hazardous weather (TAF with low visibility critical only to General Aviation (GA); or only hazardous weather, such as in a convective Significant Meteorological Information (SIGMET) message.

Today, en route weather data is processed and disseminated by the Center Weather Support Unit (CWSU) meteorologists at their workstation, the WARP. CWSU personnel are NWS employees working at each of the 20 FAA Air Route Traffic Control Centers (ARTCCs). En route weather data is also acquired and disseminated at the Air Traffic Control System Command Center (ATCSCC) by FAA personnel who have received meteorological training and also by the airline operation center dispatchers.

Aviation weather data is collected from various sources, both internal and external to the FAA, including commercial sources. For the most part, the NWS and FAA have their own equipment, but share large amounts of aviation weather data and products. Weather data/products, both hazardous and routine, come from numerous sources including radar systems, satellite sensors, PIREPs, vendor-supplied lightning data, Automated Surface Observing System (ASOS) and Automated Weather Observing System (AWOS), as well as weather observers.

CWSU meteorologists use WARP to receive and generate tailored products (e.g., advisories (Center Weather Advisory (CWA) and a Meteorological Impact Statement (MIS)) of convective activity, turbulence, etc.) to ARTCC traffic management specialists and controller supervisors to support various ATC operations. The CWA is an unscheduled weather advisory issued for controller use in alerting pilots of existing or anticipated adverse weather conditions expected during the next 2 hours. It can modify or redefine the area of a Convective SIGMET. The MIS is an unscheduled weather advisory providing similar information as the CWA, but forecasts out to 12 hours and is useful for flow control and flight operations planning.

Convective weather advisory services support two agency goals. The first is to collect, disseminate, and display current convective weather activity, which is essential for conducting safe aviation operations. Second, as convective weather accounts for over 50 percent of en route delays, it is absolutely necessary to have accurate forecasts of future convective activity if the capacity of the NAS is to meet air traffic demand when convective weather constrains routing.

Convective weather can disrupt traffic flow nationwide, causing massive flight delays and, in worst-case observations, cause aircraft accidents. Because of these impacts, the goal of the FAA is to provide timely weather and accurate forecasts to the aviation community (e.g., NAS service providers and users). Convective weather posing a significant impact to aircraft safety includes tornadoes, lines of thunderstorms, embedded thunderstorms, large hail, wind shear, moderate-to-extreme turbulence associated with thunderstorms, and light-to-severe in-flight icing. Also, areas of thunderstorm intensity greater than or equal to Video Integrator Processor level 3 with an area coverage of 40 percent or more can pose a threat to aircraft. To provide information on convective en route weather to pilots, en route controllers require timely weather radar information merged with their air traffic displays.

A major source of en route convective weather is the tri-agency (NWS, Department of Defense, and FAA) weather radar called the Next Generation Weather Radar (or NEXRAD). As part of the modernization of the national NEXRAD network, a new Radar Product Generator has been deployed that provides enhanced products with higher resolution to NAS service providers and users. Weather information is also available from the FAA's Air Route Surveillance Radars (ARSR-3/4). NEXRAD reflectivity intensity data (from WARP) as well as ARSR radars are displayed on the DSR (display system replacement) console, which provides en route sector controllers enhanced weather radar imagery integrated onto their traffic displays. The WARP processes data from multiple NEXRAD radars, creating a mosaic of precipitation intensity for DSR display. Each DSR displays radar reflectivity mosaics for three precipitation intensity levels at three different vertical levels (0-24KFT, 24-60KFT, and 0-60KFT) directly to air traffic controllers. In addition, a coverage map is displayed for the controllers that is updated every 25 seconds. The WARP provides traffic managers/supervisors with tailored products that are displayed on their remote briefing terminal. Some weather information (e.g., SIGMETs and AIRMETs) is output on paper strips for controller review and voice transmission to pilots. In other instances, controllers receive direct verbal communication from the weather coordinator, the CWSU meteorologist, another controller, pilot, or supervisor.

The Weather Message System Center Replacement (WMSCR) collects and processes a significant amount of textual weather data from the NWS and the United States Air Force Aviation Weather Network. This data is then disseminated, along with CWSU-generated advisories (CWA and MIS) and data from FAA weather systems, to Towers, Terminal Radar Control facilities, and Flight Service Stations, NWS weather forecast offices, and the airlines.

One of the best and most accurate sources of convective weather information comes directly from pilots. The en route controller or an in-flight specialist at an Automated Flight Service Station may receive these PIREPs, depending on their location. PIREPs are also sent to the AOC via direct radio contact or via Aircraft Communications Addressing and Reporting System data link. An automated PIREP, so to speak, is the datastream of airborne weather observations that are provided simultaneously to the FAA (for ITWS) and to the National Weather Service (for weather model use). The airlines and cargo carriers have significantly increased the number of their fleet aircraft that participate in the Meteorological Data Collection and Reporting System (MDCRS) program, which provides in situ observations of Winds & Temps. Humidity sensors are being added to more jetliners, and a Turbulence algorithm for incorporation into the flight management systems (FMS) is being tested. All three weather models (including the global model) used by the NAS benefit from MDCRS data, including the hourly Rapid Update Cycle model whose data output is used by FAA automation systems.

To assist en route ATC in alerting pilots of hazardous weather, the FAA implemented the National Flight Information Service (FIS). The FIS is defined as the non control, advisory information needed by pilots to operate safely and efficiently in the NAS and in international airspace. FIS includes information necessary for continued safe flight and for flight planning. Initial FIS delivers products to the cockpit by a vendor-provided data link that will allow pilots to better anticipate, plan, and request dynamic changes to the planned flight and to optimize fuel consumption and flight time. FIS products include NAS status information and basic meteorological information, in both textual and graphical formats. Later, FIS data will go to the cockpit via a digital data link to deliver NAS status and weather information to the pilot and, in doing so, will improve safety, reduce costs to users and the FAA, and increase the utility, efficiency, and capacity of the NAS.

The timely provision of high-quality, accurate, and consistent information is essential to support sound operational decisions by pilots, controllers, and dispatchers. Although Traffic Flow Management touches the terminal domain, the en route environment is where most of the decisions are made. WARP and Corridor Integrated Weather System provide NAS decisionmakers enhanced, more accurate weather products depicting impacts of weather on NAS operations.  Forecast products in user-specified formats will depict current icing and turbulence, as well as thunderstorm movement out to 1 to 2 hours, enabling ARTCC traffic managers to conduct advance planning with AOCs and the ATCSCC to optimize unaffected jet routes.

Undergoing a concept of evaluation demonstration at this time is the Corridor Integrated Weather System (CIWS). A CIWS prototype currently provides forecasts of thunderstorm activity out to two hours for the corridor extending from Chicago eastward to Washington, DC, and up into New England. CIWS will provide forecast products tailored for use in corridors where thunderstorm activity constrains routing/re-routing options for traffic flow managers.

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | ATC-Advisory |
| Capability: | Weather Advisories Capability |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 13 / 2 |

---

| | |
|---|---|
| Identifier: | 103114 |
| Name: | Current Oceanic Advisory - Weather |

Description: General

Weather advisories for oceanic operations include notification of thunderstorms, tropical cyclones, severe/extreme turbulence, or severe in-flight icing over an area affecting at least 3,000 square miles; or of embedded thunderstorms covering a much smaller area; plus any cloud-covered areas with lightning activity. Also, volcanic activity, though not a weather event and occurring infrequently, can produce ash clouds that reach cruise altitude and propagate via winds aloft for thousands of miles. Ash plume penetration by a jetliner has resulted in all engines shutting down and significant altitude loss before the pilot could restart engines to bring the aircraft under control.

At the oceanic ARTCCs in Oakland and New York, the Center Weather Service Unit (CWSU) meteorologists obtain information on oceanic weather from various sources to support the air traffic control and traffic management functions. Also having oceanic reponsibilities is the Anchorage ARTCC. There, the Weather Coordinator (WC), a FAA air traffic controller, collects data from the CWSU and disseminates it to various supervisors. Dispatchers at the Airline Operations Centers (AOC) and third-party contract service providers also collect oceanic weather information.

Aviation Weather

Aviation-impacting weather (e.g., convection, turbulence, or icing) over oceanic regions not only poses a safety hazard, but also can cause flight delays. In worst-case scenarios, encounters with convection or turbulence can result in aircraft damage and/or passenger and flight attendant injuries (or fatalities). Oceanic communications between pilots and controllers are not optimal and often time-consuming. As a result, it can take many minutes for a pilot to request a weather deviation and get a response from Air Traffic Control (ATC). Often, this requires a relay via the airline AOC dispatchers. In the event of an untimely response, a pilot is sometimes required to use his/her emergency decisionmaking authority and execute a non-coordinated divert [around the weather]. Occasionally, the resulting actions can cause a loss of standard separation from other aircraft in the vicinity without any transition. Any reduction in separation minimums, such as Reduced Vertical Separation Minima or decreasing lateral/longitudinal spacing, would require more accurate and timely weather forecasts of convection, turbulence, and in-flight icing products being delivered to the flight deck. This would allow sufficient time to assess the impact along the flight path and coordinate any diversions with ATC. Because of these impacts, it has always been the goal of the aviation community to have accurate, timely weather data over NAS oceanic regions. The primary concern is collecting, disseminating, and displaying convection, turbulence, and in-flight icing observations as well as providing accurate forecasts of their occurrence for strategic and tactical planning purposes.

Aviation Weather Data Sources

International Automated Flight Service Stations (IAFSS) in Oakland, New York, and Miami provide international pilot briefings and are equipped with en route/transoceanic communications. These sites have the telecommunications to obtain international weather information and to disseminate International Civil Aviation Organization (ICAO) flight plans. One of the best and most accurate sources of aviation-impacting weather information over oceanic regions comes directly from pilots. Pilot Reports (PIREP) contain a description of the actual flight conditions encountered (e.g.,turbulence, in-flight icing, winds, cloud-top levels) and other significant weather information. These PIREPs contain visual observations by the pilot and/or from the aircraft radar of weather occurrences such as lightning and thunderstorm formation. PIREPs are transmitted via direct radio communication with the oceanic controller or specialist at an Automated Flight Service Station. PIREPs are also sent to the AOC via direct radio contact or via data link. Third-party contract service providers also collect PIREPs for the AOC over oceanic regions. In addition, satellite imagery from Geostationary Orbiting Earth Satellites is available to the oceanic controller. The AOC dispatcher also obtains this imagery but from commercial services. These data can also be displayed to the Air Route Traffic Control Center traffic management unit.

Weather Advisories

Advisories regarding reconvection, turbulence, or in-flight icing (and volcanic ash) are issued to pilots during preflight briefings by the AOCs and IAFSS or via computer self-briefings. While airborne, the pilot can receive these advisories from the controller or AOC dispatcher, or via a service provider data link. The messages contain information on the intensity and location of convective weather, turbulence, or in-flight icing along the flight path pertinent to safety of flight. The controller receives the advisory messages from the WC printed on a flight progress strip at the control position. Routine winds aloft and temperature data are provided to automation systems, such as Dynamic Ocean Tracking Plus, for transoceanic routing planning purposes for the pilot to exploit tail winds and avoid head winds where practical.

In addition, for oceanic regions, an International Significant Meteorological (SIGMET) Information advisory message is issued by the NWS' Aviation Weather Center in Kansas City that covers several events affecting aircraft safety. THE international SIGMET is valid for 4 hours for convection, turbulence, in-flight icing; 6 hours for tropical cyclones/hurricanes; and 12 hours for volcanic ash.

Traffic Management

Traffic managers in the oceanic facilities and at the Air Traffic Control System Command Center have a role in planning for the effects of oceanic weather. After receiving a depiction of oceanic weather, oceanic ATC personnel work with AOC dispatchers to plan and generate flexible oceanic tracks. These tracks avoid areas of known convective activity, turbulence, and so forth and allow for maximum exploitation/avoidance of winds aloft and reflect current separation standards. DOTS (Dynamic Ocean Track System) uses forecasts of winds aloft to optimize oceanic routing. Only satellites and PIREPs provide weather information over the oceanic regions, but technology does exist that assists the specialist and meteorologist in planning for these routings.

Benefits: Current operations are provided in the NAS.

| | |
|---|---|
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | ATC-Advisory |
| Capability: | Weather Advisories Capability |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 14 / 2 |

---

| | |
|---|---|
| Identifier: | 103116 |
| Name: | Initial Improved Weather Information from Non-Ground Based Sensors |
| Description: | Additions to the sensor network from non-ground based sensors (e.g., satellite and aircraft) provide Operators and the ANSP with enhanced weather information to improve flight and clearance planning, trajectory based operations, and flow management. The enhancements include greater 3-D resolution of weather information/hazards in specifically affected airspace enabling users to better understand the potential impacts of weather on airspace or airports (e.g., regions of turbulence, convection, terminal winds). The result is increased reliability of forecasts for turbulence, convection, and in-flight icing improving the effectiveness and efficiency of all aspects of the operation including turbulence and icing impacts to in-flight aircraft. In addition, terminal area forecasts of fog and ceilings are improved to provide the ability to match strategic flow plans to conditions and optimizing use of the airport.<br>Satellite and aircraft water vapor sensors better define atmospheric moisture by actively collecting and transmitting essential networked-enabled weather observations to ground-based systems for integration with other weather information into the 4-D Weather Data Cube (and later on into the 4-D Weather Single Authoritative Source (4-D Wx SAS)). This enhances the accuracy of in-flight icing and convective forecasts. Turbulence algorithms added to flight management systems provide more objective (accurate) and frequent turbulence reporting which is essential to improved turbulence forecasting and warnings to in-flight aircraft. Planned new satellite-based sensors improve detection and will also assist in the prediction of fog and ceilings that impact airport departures/arrivals. The expansion of aircraft types carrying these sensors improves atmospheric sampling from the atmospheric boundary layer up through maximum flight levels, which improves aviation model forecast output. Once in the 4-D Weather Data Cube, this information is disseminated to ANSPs, users, and their automation systems, providing reliable, timely and consistent weather information that enables them to mitigate the impacts of weather on operations. |
| Benefits: | *Increased Safety<br>*Increased Capacity<br>*Enhanced efficiency<br>*Improved weather observations |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2013 - 2018 |
| Solution Set(s): | Reduce Weather Impact |

| | |
|---|---|
| Service: | ATC-Advisory |
| Capability: | Weather Advisories Capability |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 24-Feb-2010 by Richard Shaw |
| ID / Revision: | 12 / 10 |

---

Identifier: 103119

Name: Initial Integration of Weather Information into NAS Automation and Decision Making

Description:

Advances in weather information content and dissemination provide users and/or their decision support with the ability to identify specific weather impacts on operations (e.g., trajectory management and impacts on specific airframes, arrival/departure planning) to ensure continued safe and efficient flight. Users will be able to retrieve (and subscribe to automatic updates of) weather information to support assessment of flight-specific thresholds that indicate re-planning actions are needed. In particular, the 4-D Weather Data Cube (and later The 4-D Weather Single Authoritative Source (4-D Wx SAS)) will support enhanced volumetric extractions, by time frame of interest, of weather information by NAS users to quickly filter the enhanced weather content to the region of interest for impact analysis. This will streamline the process by which the user - with or without decision support ATM tools - conducts system-wide risk management in planning for both individual flight trajectories and flows.

Because of the profound impact of adverse weather on the safety, efficiency, and capacity of the NAS, improved decision making when weather impacts operations is a key NextGen objective. The initial 4-D Wx SAS, a subset of the 4-D Weather Data Cube, provides a consistent, de-conflicted common weather picture (e.g., observations, forecasts, and climatology, from the surface to the top of the NAS) that will provide ANSPs and users with a common view of the weather situation.

Using the 4-D WX SAS, ANSPs, users and their decision support systems will be able to make trajectory-oriented or area-oriented requests for weather information so that they can determine its affect on the flight trajectory being evaluated. This customized weather information will be integrated into initial tactical and strategic decision support tools developed under the TBO, CATM, Flexible Terminal, and High Density Terminal solution sets. These tools will assess the risk management of the operational impact of weather on flights/trajectories and provide candidate actions to the ANSP that mitigate these impacts on safety and traffic flow. These tools support real time "what if" assessments, support common situation awareness within and between domains, and can be tailored to support different user preferences (e.g., displays, lists, alert modes, flight specific probabilistic thresholds, and format tailoring). The SAS provides an unambiguous current weather state and prediction of the future weather, as well as the user-requested high resolution, high temporal characteristics of importance to aviation users. The 4-D Wx SAS will also provide proactive updates ("push") to requestors based on user requests.

The combination of consistent weather information integrated into decision support tools will enable more effective and timely decision making by both ANSPs and users, for meeting capacity, efficiency and safety objectives. This also supports the alignment of traffic flows that best achieve capacity balance, safety and end user desires. It effectively enables a common understanding of the uncertainty of the future state of the atmosphere, supports traffic flow management by trajectory, and provides for improved weather avoidance.

Benefits:

*Enhanced efficiency
*Enhanced safety
*Increased capacity

Time Frame: Mid Term

Earliest IOC - Latest IOC: 2011 - 2018

Solution Set(s): Reduce Weather Impact

Service: ATC-Advisory

Capability: Weather Advisories Capability

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 25-Feb-2010 by Richard Shaw

ID / Revision: 8 / 8

---

Identifier: 103121

Name: Full Improved Weather Information and Dissemination

Description: This improvement provides the full capability that supports the NextGen concept of operations to assimilate digital weather information into decision-making for all areas of operations.

The net-centric access of weather observations, analyses, forecasts (including probability), and climatology via a robust 4D Weather Data Cube and a de-conflicted 4-D Weather Single Authoritative Source (4-D Wx SAS) becomes complete. Requisite weather information is 'pushed' to ANSPs, flight operations, and aircrews if a change in weather may potentially impact operations (based on user-defined weather thresholds of interest). All weather information is provided at the appropriate aviation decision-maker tailored resolution, update frequency, geographic scale, etc. crucial to NextGen operations. Improved accuracy of forecast information and universal access to the 4-D Wx SAS enables integration of weather and its uncertainty into user and ANSP decision support tools, which supports risk management.

Today, the NAS is unable to provide a common weather picture for universal use. When aviation decision makers use weather information that is inconsistent in source, derivation and content, collaborative decision making is virtually impossible. Given a common weather picture, aviation operations that can be affected by weather are made more consistent with respect to potential system and individual flight operation impacts. The resolution of these impacts can be formulated more effectively and decision making becomes more seamless over operational times, boundaries, and activities. NextGen's mid-term implementation of the 4-D Wx SAS begins to rectify these inefficiencies.

In the far-term, the 4-D Wx SAS matures, meeting all NextGen operational decision-making performance requirements for accuracy, latency, availability, etc. Also, the mechanism involved in determining the SAS, from available weather sources, becomes dynamic, highly automated, and more effectively provides the 'best' source of weather information to stakeholders to support operational decision making.

The 4-D Wx SAS also meets the needs of stakeholders for tailored weather information directly applicable to all manner of NextGen era decisions. Stakeholders can pull tailored weather information or it can be proactively updated ("pushed") based on user requests. Safety, efficiency, and capacity are enhanced by providing decision makers and decision support tools with tailored weather information such as: timing of a wind shift to more effectively support airport runway reconfiguration; flight impacting weather along a 4DT; high-resolution terminal area wind forecasts to support arrival/departure operations; or timely hazardous weather information from a lead aircraft that is provided to following aircraft.

Combined with universal (net-centric) access, the 4-D Wx SAS provides a common weather picture to all stakeholders and decision support tools (DSTs). This common weather picture facilitates effective collaborative decision making, supports traffic flow management by trajectory, and allows users to duplicate and better understand tactical ANSP recommendations.

Benefits:
·Enhanced efficiency
·Enhanced safety
·Reduced flight times and emissions

Time Frame: Far Term

Earliest IOC - Latest IOC: 2016 - 2023

Solution Set(s): Reduce Weather Impact

Service: ATC-Advisory

Capability: Weather Advisories Capability

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 24-Feb-2010 by Richard Shaw

ID / Revision: 7 / 41

---

Identifier: 103122

Name: Full Improved Weather Sensor Network

Description: New ground, airborne (including UAS), and space-based (e.g., satellite) sensors, when combined with additional mid-term sensors, provides a complementary network of weather sensors that enhances early detection capability and increases forecast accuracy for three - seven day forecasts.

Integration of the enhanced sensor data into weather forecasts, ANSP decision support tools, and user flight-optimization tools provides NAS stakeholders with extended look-ahead capabilities for weather avoidance trajectories through risk mitigation. The increased information allows the more accurate initiation of forecast models so they can better depict the beginning of a weather event. The increased 3-7 day forecast accuracy will greatly increase the strategic planning efforts of the ANSP and the operators. New global forecasts will support improved flight planning and operations for international arrival and departures. Additional in-situ information will enhance remote virtual tower operation. The sensor network will be incrementally improved and right-sized to ensure information sufficiency, reliability, and availability while reducing life-cycle costs.

Additional satellite sensors with enhanced detection technologies combined with tailored atmospheric focus, better defines the atmosphere by actively transmitting aviation-relevant weather observations to ground-based systems. These are further incorporated with ground- and airborne-based weather sensor information into the 4D Weather Data Cube and the 4-D Weather Single Authoritative Source (4-D Wx SAS). As an example, new satellite-based sensors and emerging ground-based capabilities will provide enhanced atmospheric observations to support emerging far-term Operational Improvements such as self-separation in en-route airspace and other 4DT trajectory-based NextGen operations in Super Density airspace.

The expansion of airborne sensors to additional aircraft types, the fielding of new technology sensors, and new technology UAS sensors provide enhanced atmospheric information by actively collecting and transmitting essential weather observations regarding moisture, temperature, turbulence, icing, and winds. These sensors improve atmospheric sampling, from the atmospheric boundary layer up through maximum flight levels, which further improves aviation weather forecast model output at lower flights levels and extends the reliability of longer term forecasts. Once in the 4-D Weather Data Cube, this information is disseminated to ANSPs, users, and their automation systems, providing reliable, timely and consistent weather information enabling them to mitigate the impacts of weather on operations through common situational awareness provided via the 4-D Wx SAS.

The addition of new technology ground-based sensors as well as quality controlled, non-Federal ground-based surface observing sensors enhances weather information for operations. Cost savings in this timeframe are realized by right-sizing the entire suite of sensors. This is accomplished by comparing operationally required information (resolution, reliability, availability, etc.) with sensor capability, density, and duplication. Additional cost savings are realized by providing necessary connectivity and automation to control and configure the sensor network to optimize meeting changing needs of ANSP and user requirements.

Benefits: Increased efficiency

Time Frame: Far Term

Earliest IOC - Latest IOC: 2016 - 2023

Solution Set(s): Reduce Weather Impact

Service: ATC-Advisory

Capability: Weather Advisories Capability

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 28-Jan-2010 by Richard Shaw

ID / Revision: 6 / 6

---

Identifier: 103123

Name: Full Integration of Weather Information into NAS Automation and Decision Making

Description: Further advances in weather information content/dissemination and a NAS-wide increase in the direct integration of weather into decision support tools will enable users and service providers to more precisely identify specific weather impacts on operations (e.g., trajectory management and impacts on specific airframes, arrival/departure planning) to ensure continued safe and efficient flight.

NAS automation tools directly utilize weather information (including uncertainty), demand information, and other capacity constraints to analyze the integrated information picture. The results of this analysis allows users and service providers to select from among proposed, automation-developed mitigation strategies to balance demand to available capacity, both strategically and tactically. These strategies will minimize weather-induced changes to user-preferred flight plans (e.g., fewer flights rerouted) as the weather-impacted airspace will be more precisely defined in both extent and timing, based on enhanced weather observations and forecasts, including probabilities. Both the user and the Air Navigation Service Provider (ANSP) will have these automation systems, which will be linked and share a single source for weather information, to enable automated negotiation of the proposed strategies, unique to the weather and traffic situation. The availability of enhanced weather information, integrated with automated decision support tools, will be increasingly extended to the cockpit to ensure safety, and maintain flight efficiency.

Because of the profound impact of adverse weather on the safety, efficiency, and capacity of the NAS, improving ATM decision making, when weather impacts operations, remains a key NextGen objective for the long-term. Mid-term advances will put into place many of the initial building blocks needed to accomplish this objective. The 4-D Weather Data Cube (and 4-D Weather Single Authoritative Source (4-D Wx SAS)) provides a consistent, de-conflicted common weather picture (e.g., observations, forecasts, and climatology, from the surface to the top of the NAS) that will provide ANSPs and users with a common view of the weather situation. In addition, initial versions of decision support tools that integrate weather information into their decision analyses will be deployed.

In this timeframe, the full 4-D Wx SAS extends the observation and forecast information that was made available in the initial version of the 4-D Wx SAS. It will continue to provide a consistent, seamless common weather picture of information, but the observation and forecast information will be: more precise; more rapidly updated; of higher resolution; and directly useable by automation without human intervention. In addition, probabilistic weather forecasts quantify risks that potentially impact weather will occur. As a result, a more exact assessment (in terms of volumetric extent, timing, and severity) of the weather-impacted airspace is derived to inform development of strategic and tactical mitigation actions that minimize impacts on user flight plans.

The use of a new generation of weather-integrated decision support tools will become more prominent in helping users and ANSPs respond to identified weather impacts. The customized weather information, provided by the enhanced 4-D WX SAS, will be integrated into these advanced tactical and strategic decision support tools developed under the TBO, CATM, Flexible Terminal, and High Density Airport solution sets. These tools will assess the operational impact of weather on flights/trajectories (including estimation of aircraft-specific weather hazard levels), and provide candidate actions to the ANSP and user that mitigate the impacts of weather on traffic flow and safety. The improved observation and forecast information will enable those developed actions to be less disruptive to the NAS. For example, probabilistic weather forecasts will enable transition from today's overly conservative flow planning to a paradigm of risk-based traffic management initiative (TMI) development where strategies are incremental and affect fewer flights. The automation integration will be extended to include direct integration of ANSP decision support capabilities with those of users to, for example, negotiate trajectory changes. Over time, the combination of trusted weather information and weather-integrated decision support tools will reduce the occurrence where human decision makers must evaluate and decide what to do; the decision makers will trust the solutions proposed by the automation, and execute them.

Direct information dissemination by 4-D WX SAS will also provide proactive updates ("push") to requestors as the weather situation changes. Because of the increased use of air/ground data communications, delivery of safety-critical weather information directly to the flight crew will be increased. Pilots will integrate weather information into their flight deck support tools to identify and avoid hazardous weather along their flight path, while preserving flight efficiency where possible.

The combination of consistent weather information and decision support tools that utilize it will enable more effective and timely decision making by both ANSPs and users, for meeting capacity, efficiency, and safety objectives.

Benefits: Increased efficiency

Time Frame: Far Term

Earliest IOC - Latest IOC: 2016 - 2023

Solution Set(s): Reduce Weather Impact

Service: ATC-Advisory

Capability: Weather Advisories Capability

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 24-Feb-2010 by Richard Shaw

ID / Revision: 5 / 7

---

Identifier: 103201

Name: Current Traffic Advisory

Description: Air traffic controllers radio traffic advisories to pilots. Advisories must be used in certain instances (e.g., merging target situations), but it is good operating practice to use them at all times. They help both controllers and pilots when two aircraft, in airspace or a surface area, are close together. Traffic advisories have the effect of reducing pilot-controller radio transmissions, and thus frequency congestion, by alerting the pilot of situations he/she might otherwise question.

Radar Traffic Advisories

FAA surveillance and automation systems provide data used in advisories to controllers, who view processed radar on one of several types of consoles, including the Display System Replacement for the Host Computer System (HCS) and the Automated Radar Terminal System display. Primary radar systems provide surveillance data generated by radar transmissions reflected back to the radar by the aircraft (i.e., primary radar returns, or "skin paint"). Secondary surveillance systems, also known as beacon systems, provide additional target information, including aircraft identification and altitude. Air traffic control automation systems process and correlate data from primary and secondary surveillance systems and display the resulting surveillance reports on the controller's display.

Data depict a primary radar target, a limited data block and target, or a full data block and target. A limited data block provides only beacon code data and altitude if available. A full data block provides the aircraft call sign, assigned altitude, reported altitude, ground-speed readout, and other data relevant to the aircraft. The controller uses the displayed data for, among other things, traffic advisories.

A primary radar target provides the least amount of information to the controller that can be passed as a traffic advisory. This type of target tells the controller only position information. A primary radar target can be identified, and the controller can obtain additional information if he/she is in contact with the aircraft. A limited data block can provide beacon code data and altitude if the aircraft has a Mode C (altitude encoding) transponder. If the controller is in contact with the aircraft, a limited data block provides the controller data to give a basic traffic advisory. A full data block and the associated flight progress strip also provide the data for a complete traffic advisory.

Non-radar Traffic Advisories
Terminal and tower controllers give non-radar traffic advisories regarding known or observed traffic in the vicinity of airports. Likewise, en route controllers and Automated Flight Service Station (AFSS) specialists provide non-radar traffic advisories regarding known traffic. As with radar traffic advisories, this information assists both pilots and controllers because they share information and avoid unnecessary frequency congestion. Controllers often use this type of advisory to assist the pilot during arrival or departure.

Traffic Alert and Collision Avoidance System Advisories
Federal Air Regulations require that foreign and domestic airlines and other similar transport aircraft be equipped with Traffic Alert and Collision Avoidance Systems (TCAS). This equipment enhances pilots to view surrounding aircraft and provides traffic and resolution advisories when necessary. The TCAS display identifies the location of other traffic by showing relative position and altitude of targets with altitude-encoding transponders. TCAS II also provides resolutions in the vertical plane.

Flight Data
Certain information about each aircraft and its intended flight plan are useful to controllers in providing traffic advisories. The controller must know the aircraft's company call sign and flight number or the aircraft's registration number to communicate with the pilot. They must also know the aircraft's type to identify the aircraft to other aircraft, and to know flight capabilities for assigning routes of flight and altitude.

The flight data for traffic advisories, generally, in the format of an FAA flight plan, originates with the pilot or the pilot's company. The data enters the HCS through AFSSs, military base operations, Direct User Access Terminal System, commercial vendors on the Internet, air carrier or air taxi operations centers, prefiled flight plans, or directly from an FAA facility that has direct access to the NAS computer system.

The controller receives flight data through automated means. It is generally in the form of printed Flight Progress Strips from the Flight Data Input/Output equipment or from computer updates or readout messages.

Duty Priorities

When the radar targets of two aircraft will merge and vertical separation between the two aircraft is not more than the minimum required, the controller applies merging-target procedures, which include mandatory traffic advisories. The procedures are not required for non-turbojet aircraft below 10,000 feet; however, good operating technique calls for issuing a traffic advisory.

Traffic advisories, except for the merging-target requirement, fall within the lower-priority additional services category. A controller's first priority is to separate aircraft and issue safety alerts, then he/she provides additional services. Thus, as a controller's workload increases, he/she may sometimes be forced to discontinue issuing traffic advisories.

Aircraft flying under visual flight rules can request radar traffic advisories (flight following) from an air traffic control facility. Controllers comply as the workload permits.

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | ATC-Advisory |
| Capability: | Traffic Advisory |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 126 / 2 |

| | |
|---|---|
| Identifier: | 103206 |
| Name: | Expanded Traffic Advisory Services Using Digital Traffic Data |
| Description: | Surrounding traffic information is available to the flight deck, including automatic dependent surveillance (ADS) information and the rebroadcast of non-transmitting targets to equipped aircraft. Surveillance and traffic broadcast services improve situational awareness in the cockpit with more accurate and timely digital traffic data provided directly to aircraft avionics for display to the pilot.<br><br>Surveillance and traffic broadcast services are supplemented with traditional traffic advisories provided by the air navigation service provider (ANSP). ANSP continues providing voice traffic advisories to unequipped aircraft.<br><br>Aircraft equipped with surveillance service avionics broadcast their position derived from onboard navigation systems. Additional broadcast information includes airspeed, altitude, and vector data. Equipped aircraft receive broadcasts and display traffic data to the flight crew. Ground based systems receive surveillance broadcast reports and provide them to the surveillance data network (SDN) for distribution.<br><br>Traffic broadcast service provides a comprehensive view of digital traffic information to properly equipped aircraft and surface vehicles. Data sources include airport and surface surveillance radars and multi-lateration systems. SDN maintains and distributes surveillance data from these sources. |
| Benefits: | ·Enhanced efficiency<br>·Improved safety<br>·Enhanced situational awareness |
| Time Frame: | Near Term |
| Earliest IOC - Latest IOC: | 2009 - 2010 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | ATC-Advisory |
| Capability: | Traffic Advisory |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Jan-2010 by Richard Shaw |
| ID / Revision: | 125 / 4 |

| | |
|---|---|
| Identifier: | 103207 |
| Name: | Improved Runway Safety Situational Awareness for Controllers |

| | |
|---|---|
| Description: | At large airports, current controller tools provide surface displays and can alert controllers when aircraft taxi into areas where a runway incursion could result. Additional ground-based capabilities will be developed to improve runway safety that include expansion of runway surveillance technology (i.e., ASDE-X) to additional airports, deployment of low cost surveillance for medium-sized airports , improved runway markings, and initial controller taxi conformance monitoring capabilities. These ground-based tools will provide a range of capabilities to help improve runway safety for medium- to large-sized airports. |
| Benefits: | *Increased safety |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2012 - 2016 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | ATC-Advisory |
| Capability: | Traffic Advisory |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 24-Feb-2010 by Richard Shaw |
| ID / Revision: | 128 / 7 |

---

| | |
|---|---|
| Identifier: | 103208 |
| Name: | Improve Runway Safety Situational Awareness for Pilots |
| Description: | Runway safety operations are improved by providing pilots with improved awareness of their location on the airport surface as well as runway incursion alerting capabilities. To help minimize pilot disorientation on the airport surface, a surface moving map display with ownship position will be available. Both ground-based (e.g., RWSL) and cockpit-based runway incursion alerting capabilities will also be available to alert pilots when it's unsafe to enter the runway. Additional enhancements may include cockpit display of surface traffic (e.g., vehicles and aircraft) and the use of a cockpit display that depicts the runway environment and displays traffic from the surface up to approximately 1,500 feet above ground level on final approach and will be used by the flight crew to help determine runway occupancy. |
| Benefits: | *Increased safety |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2012 - 2016 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | ATC-Advisory |

Capability: Traffic Advisory

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 26-Apr-2010 by David Bartlett

ID / Revision: 127 / 8

---

Identifier: 103301

Name: Current NAS Status Advisory

Description: The current National Airspace System (NAS) Status Advisory updates pilots on NAS status that is essential to their aircraft's safety and efficiency. Updates on a NAS resource status that has changed or was not readily available during flight planning are either broadcast (via Very High Frequency Omnidirectional Range (VOR) -Voice) or voice transmitted directly to in-flight aircraft by controllers at air traffic control (ATC) facilities, specialists at flight service stations/automated flight service stations, and personnel at Airline Operations Centers (AOC) and other facilities. The NAS status information includes changes to the operational status of airspace, airports, navigation aids, in-flight or ground hazards, traffic management directives, and other data. The advisory includes digital broadcasting of automatic terminal information service, (D-ATIS), data, including runway status and weather information to pilots.

Air Route Traffic Control Center (ARTCC):
Air traffic controllers in en route centers transmit a variety of information to pilots concerning NAS status. Controllers use communication and computer systems, such as the Voice Switching and Control System, (VSCS), and the Host Computer System, (HCS), to send pilots and AOCs alerts about hazardous weather, airport conditions, and air traffic control restrictions and traffic information, as well as any other pertinent data. Weather information includes severe turbulence and severe icing. Airport conditions encompass runway closures, weather information, and navigational aid outages. Air traffic control restrictions and traffic information include reroutes due to traffic, miles-in-trail restrictions, special use airspace, (SUA), status, Severe Weather Avoidance Plan (SWAP) programs, and Sector/Center constraints.

Air Traffic Control System Command Center (ATCSCC):The ATCSCC monitors and manages NAS to ensure a safe, orderly, and expeditious, air traffic flow while minimizing delays. The ATCSCC issues traffic management directives that directly affect pilots and airlines; they include alternative routes, ground-delay programs, SWAP, the national route program, and sequencing programs. The ATCSCC initiates and executes all directives in concert with the affected ATC facilities and user operations centers through the collaborative decision making (CDM) program. The ATCSCC specialist notifies affected users through teleconferences and other communication channels, such as the National Airspace Data Interchange Network, (NADIN), Aeronautical Radio Incorporated, (ARINC), and the Enhanced Traffic Management System (ETMS) system.

Airline Operations Center (AOC):
The AOC is responsible for operating an airline's fleet of aircraft safely and efficiently. AOC dispatchers schedule aircraft and flight crews and develop and administer the policies and procedures for maintaining safety and meeting all Federal Aviation Administration operating requirements. Part of flight operations, dispatchers release (dispatch release) flights for takeoff after reviewing all factors that affect a flight. These include the weather, flight routes, fuel requirements, and the amount and distribution of weights onboard the aircraft. Through the CDM process, AOC dispatchers communicate with the ATCSCC personnel who update dispatchers with NAS status advisories. Dispatchers then update any affected pilots, recommending flight plan alternatives and, with the pilot, deciding on a course of action.

Air Traffic Control Tower:
Tower controllers receive information on the status of NAS systems from various sources. They receive data on routes revised due to convective weather or ground-delay programs via the flight data input/output (FDIO) equipment and distribute the information to appropriate flights via the predeparture clearance function of the tower data link service. Controllers monitor some NAS equipment components directly in the tower, such as instrument landing systems, approach light systems, and very high frequency (VOR) navigational aids at the airport. These systems typically have both aural and visual alarms that alert controllers when systems fail. Controllers transmit equipment failure information to affected pilots over radio frequencies and to adjacent facilities via landlines and FDIO devices or through ETMS.

The airways facilities technician is another source of system outage information. The technician monitors the systems in the facility equipment rooms, and when the individual detects an outage, he/she informs air traffic personnel.

The notice to airmen (NOTAM) provides outage information for systems not located at the airport but which are still pertinent to operations, such as a departure fix VOR. The information is processed in the Host computer system or ETMS. Outage information may be placed on the D-ATIS or may be transmitted to affected flights via radio frequencies. As the status of critical equipment changes, this information may be broadcast from all positions simultaneously. In addition, information provided to affected flights includes equipment status, status of military operations areas, ground-delay programs, and SWAP routings obtained from the ARTCC.

Terminal Radar Approach Control (TRACON):
TRACONs also monitor navigational aids and obtain and distribute status information using the same systems as air traffic control towers. In addition, TRACONs usually monitor and provide status on both primary and secondary radar systems. These systems may include airport surveillance radar, and mode select or air traffic control beacon interrogator secondary radar. Automated radar terminal systems IIE, IIIA, or IIIE and the Standard Terminal Automation Replacement System, (STARS), display radar target data. Outages of these critical systems may severely impact system capacity.

This information is shared with surrounding facilities and the ATCSCC using the voice switch system. Traffic-flow restrictions are usually implemented until systems are restored. Outages of navigational aids that affect departure routes are passed to towers and automated flight service stations so that flights may be issued alternative routes. Controllers in TRACONs also relay critical information to flights that they are controlling.

TRACON controllers use such status display systems as System Atlanta Information Display System, (SAIDS), equipment to distribute status information on a variety of items, including restricted area usage, current significant weather, runway visual range readings, significant pilot reports, and equipment problems.

Automated Flight Service Station, (AFSS), Flight Service Station, (FSS):
Flight service station specialists obtain, process, and distribute status information through either the MODEL 1 computer system or OASIS and SAIDS equipment. This information includes NOTAM data as well as traffic management programs and military activities. Pilots can obtain status information by telephone or through face-to-face briefings. They may also contact the en route flight advisory service in-flight position via radio. Pilot Reports, PIREPS), also serve as a source of information of icing, turbulence, and wind aloft reports, as well as NAS system component outages.

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | ATC-Advisory |
| Capability: | NAS Status Advisory |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 124 / 2 |

---

| | |
|---|---|
| Identifier: | 103305 |
| Name: | On-Demand NAS Information |

Description: National Airspace System (NAS) and aeronautical information will be available to users on demand. NAS and aeronautical information is consistent across applications and locations, and available to authorized subscribers and equipped aircraft. Proprietary and security sensitive information is not shared with unauthorized agencies/individuals.

Information, including Special Airspace Activity and restrictions, is collected from both ground systems and airborne users (via ground support services), aggregated, and provided via a system-wide information environment, data communications, or other means. Information and updates are obtained in near real-time and distributed in a user- friendly digital or graphic format. The data is machine-readable and supports automated data processing. Flight Service Stations will be able to provide improved information for flight planning and in-flight advisories.

Benefits:
*Enhanced safety
*Improved efficiency
*Improved information distribution and access

Time Frame: Mid Term

Earliest IOC - Latest IOC: 2013 - 2018

Solution Set(s): Improve Collaborative ATM

Service: ATC-Advisory

Capability: NAS Status Advisory

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 23-Mar-2010 by David Bartlett

ID / Revision: 123 / 14

---

Identifier: 104101

Name: Current Oceanic Conflict Probe

Description: The Federal Aviation Administration provides oceanic air traffic services to aircraft flying within specific flight information regions (FIR). These regions include a portion of the western half of the North Atlantic Ocean, much of the Caribbean region, a large portion of the Arctic Ocean, and a major portion of the Pacific Ocean. The New York and Oakland Oceanic centers are responsible for oceanic airspace, while the Anchorage Air Route Traffic Control Center provides en route and oceanic air traffic services for all Alaskan airspace. The Oceanic Air Traffic Control (ATC) systems at New York and Oakland provide air traffic services in areas outside of radar coverage. Operations are performed through procedural separation using paper flight strips. Air-to-ground communication is indirect through a third party, high frequency (HF) radio operator and multi sector oceanic data link (MSODL). Surveillance is not possible over most of the ocean. Therefore, aircraft report their positions to oceanic ATC at prescribed intervals or locations as they progress along their flight paths. Navigation is performed principally with onboard inertial navigation systems (INS) or Global Positioning Systems and communication by HF voice and data link. To allow for INS errors and communications uncertainties (e.g., atmospheric disturbances, indirect voice relayed through a third party, and language problems), current oceanic horizontal separation minima are very large. Intensive coordination is required to ensure accurate communications between FIRs via teletype, telephone, or Air Traffic Services Interfacility Data Communications.

In the New York and Oakland centers, the Oceanic Display and Planning System (ODAPS) provides a situation display of controlled aircraft estimated positions in oceanic airspace. These positions are based on the extrapolation of filed flight plan data (used by the Airline Operations Center using conventional and Dynamic Aircraft Route Planning systems) and are updated by periodic HF voice position reports, position reports via Oceanic Data Link from Future Air Navigation System 1/A-equipped aircraft or controller input. ODAPS also supports a procedural conflict probe capability. Controllers use the ODAPS interim situation display (ISD) for planning and situational awareness. The ISD does not provide the controller decision support tools required for it to be the primary means for procedural separation.

The ODAPS sites are currently using MSODL as the air traffic control communications interface tool between the controller and the pilot. MSODL enables each sector controller to retain and search through ODAPS messages and messages received from the ARINC radio operators. MSODL enables direct pilot-controller communications using data link and a pilot-to-HF radio operator data link. The oceanic workstations include an ISD, a flight strip printer and flight strip bay, and an MSODL/Flight Information Display workstation. Information received via voice must be manually input into the computer by the controller. Most information that is sent or received via data link automatically updates the ODAPS.

The conflict probe reduces the potential for a separation violation in procedural airspace and improves efficiency of air traffic services. It also reduces the need for flight plan amendments to avoid a violation of separation standards. The Oceanic conflict probe is a flight plan-based strategic conflict detection tool available to the ODAPS sector controller for aircraft flying in non radar areas. It notifies the controller if two targets are predicted to have less than minimum separation within a parameter time or if a predicted aircraft track will enter restricted airspace. The conflict probe may be initiated by an Oceanic controllers manual request; a site-specific time parameter; automatically for simple data link clearances; and by changes known to the ODAPS as potentially impacting relative aircraft positions, such as a cleared flight plan amendment. The current positions and the predicted paths of the aircraft must be extrapolated from flight plan data, infrequent aircraft position reports, and upper-wind data models. The Oceanic controller enters the probe request into ODAPS, and the oceanic conflict probe algorithm extrapolates a flight plan forward in time. The oceanic controller reviews the results to see if there is any violation of separation standards between the flight plan and the other flight plans in the flight plan database. Advanced Technology and Oceanic Procedures (ATOP) will provide data link, automatic dependent surveillance (ADS) - broadcast and ADS - addressable, conflict probe, and electronic flight progress strips, as well as other important features.

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 92 / 2 |

---

| | |
|---|---|
| Identifier: | 104102 |
| Name: | Flexible Entry Times for Oceanic Tracks |
| Description: | Flexible entry times into oceanic tracks or flows allow greater use of user-preferred trajectories.<br>Under the oceanic trajectory management four dimensional pre-departure (OTM4D pre-departure) concept, flexible entry times into oceanic tracks allow aircraft to fly minimum time/fuel paths. Air Navigation Service Provider (ANSP) automation reviews the request and negotiates adjustments to entry time requests. By incorporating entry optimization algorithms within the request review process, flights trade-off some near-term suboptimal profiles to achieve more optimal oceanic profiles. |

| | |
|---|---|
| Benefits: | ·Greater use of user-preferred trajectories<br>·Decreased flight time<br>·Reduced fuel burn and engine emissions<br>·Increased user access and efficient use of oceanic airspace |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2011 - 2013 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Jan-2010 by Ward Huston |
| ID / Revision: | 93 / 6 |

---

| | |
|---|---|
| Identifier: | 104103 |
| Name: | Current Conflict Probe |
| Description: | Conflict probe increases efficiency of airspace use in the en route domain. It assists in synchronization of en route traffic by identifying potential separation violations, both aircraft/aircraft and aircraft/airspace, early enough to avoid them. This results in better management and balance of the sector traffic capacity. Conflict probe also improves the ability of controllers to accommodate pilot requests for flight plan changes, thereby enabling the user to fly the most desirable route. This, in turn, reduces delays and costs to the user.<br><br>The radar associate controller is responsible for strategic identification and analysis of separation problems. Current conflict probe is a mental process carried out by the radar associate controller who analyzes the paper flight progress strips for the sector to detect potential conflicts. A series of flight progress strips is printed for the posting fixes along a flight's planned route in each sector, beginning approximately 30 minutes before the flight enters the facility's airspace. Additional flight progress strips for the sector are printed as the flight progresses to within the flight strip lead-time for subsequent sectors.<br><br>En route controllers now use a decision support tool called URET (User Request Evaluation Tool). The URET automatically predicts and notifies controllers of conflicts between aircraft or aircraft and special activity airspace. The system also allows controllers to quickly determine whether proposed flight path changes will conflict with en route traffic or airspace. By allowing controllers to evaluate route change requests and to assign conflict-free routing, the airspace users are able to save both time and fuel. URET capabilities include automatic conflict detection, and automated tools for solution trial planning and electronic flight data management.<br><br>When using the manual system, the radar associate controller coordinates with other sectors to determine the conflict status of aircraft entering and/or leaving his/her sector. In performing this function, the controller, using flight progress strips and the radar display, may calculate fixed radial distances, evaluate traffic flow direction based upon altitude, project where aircraft may cross, and correlate time. When necessary, the controller marks the flight progress strip with corrected or updated information. The Host Computer System (HCS) is updated to maintain coordination between the controllers' actions and the HCS flight database. In areas not covered by radar surveillance, controller analysis of the flight progress strips may provide the only available information on an aircraft's position and intent. |

To determine which flight progress strips to provide to each sector, the radar associate controller divides the sector into non-overlapping volumes of airspace called Fix-Posting Areas (FPA). Each FPA has one posted fix defined within it either by a ground-based navigational aids or by the HCS, which is used to determine which flight progress strips should be provided to that sector. The strips are placed in the sector's strip board, grouped by posted fix, then arranged by time. The radar associate controller scans the time-sorted flight strips at various altitudes. Conflicts are predicted by the time proximity of flights at the same altitude at each posting fix. If a potential conflict is identified, the radar associate controller will mark the flight strip and may also verbally inform the radar controller of the situation. The radar controller is responsible for the tactical resolution of the potential conflict. Depending on the traffic situation, the radar controller may take immediate action to resolve the conflict or may allow the situation to develop before taking action. Conflict-resolution actions may include tactical maneuvers such as clearances for aircraft to vector off course to avoid each other. Conflict-resolution actions take precedence over accommodating user requests. In this way, the radar associate controller is performing a near continuous conflict probe on the aircraft in his/her sector.

In addition, the radar controller may receive a request from the pilot for a flight plan change. Assuming that the traffic situation in the sector will permit the request, the radar associate controller will analyze the pilot's request, using flight progress strips to determine if it will create a conflict situation with other traffic in the sector. He/she will then inform the radar controller of the results of the conflict analysis, who will take the appropriate action. In this way, the radar associate controller provides a what if conflict probe, a trial plan, in response to a user request.

The radar associate controller (or the radar controller in the absence of the radar associate controller) must know the structure of the airspace (airways, fixes, routes); airspace shape and boundaries, associated procedural requirements such as separation minima for that airspace; location of airports, navigational aids, special use airspace, aircraft performance characteristics to support conflict resolution; and so on. The controllers are supported by adaptations in the automation systems that provide situational awareness. For example, traffic is organized along various standard routes (primarily, though not exclusively, for arrivals and departures) that are defined in HCS adaptation. Fix postings are defined in HCS adaptation for each of these standard routes to enable the printing of the flight progress strips used in conflict probe. In addition, the HCS is adapted to display the airspace shape and boundaries of each sector and the locations of special use airspace to support conflict probing between aircraft and airspace.

Cruise conflict probe encompasses probe analysis on conflicts between aircraft and the following: (1) Other Aircraft: There is no automation support. A pilot request for a route change is more likely to be granted when the radar controller has the support of a radar associate controller to analyze the requested route and identify possible conflicts; (2) Airspace: same as "Other Aircraft," except that controllers use the HCS maps as displayed on the display system replacement (DSR) equipment, and use this same DSR equipment to access data on the current status of military operations areas or restricted areas; and (3) Weather: The pilot is responsible for separation from weather. Controllers will provide advisory information and strongly suggest that the flight use a different route.

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 86 / 2 |

---

| | |
|---|---|
| Identifier: | 104105 |

| | |
|---|---|
| Name: | Automated Support for Trajectory Negotiation |
| Description: | Trajectory management is enhanced by automated assistance to negotiate pilot trajectory change requests with properly equipped aircraft operators.<br><br>Four-Dimensional Trajectories (4DTs) are negotiated between the pilot/aircraft operator and the air navigation service provider (ANSP), using ground-based automation to provide trial planning using intent data in en route trajectory-based operations. A trajectory change can be requested by an Unmanned Aircraft System (UAS) operator, Flight Operations Center (FOC) personnel or flight deck. The trajectory change would then be relayed to the pilot/aircraft operator over a safety critical link. The aircraft operator must acknowledge receipt and acceptance of the negotiated trajectory change.<br><br>Decision support tools identify complexity and density conditions and provide alternatives to the ANSP. These alternatives include proposed trajectories, or intent data, that are exchanged with the operator via data communications, allowing solutions that are not subject to constraints imposed by voice. This will enable higher density of operations thus higher capacity as well as decrease human errors in trajectory negotiation and data entry. |
| Benefits: | ·Increased efficiency<br>·Enhanced safety<br>·Reduced frequency congestion |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2018 - 2025 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 91 / 10 |

---

| | |
|---|---|
| Identifier: | 104109 |
| Name: | Current Arrival/Departure Sequencing |
| Description: | The spacing and sequencing of air traffic safely maximizes the efficiency and capacity of the NAS throughout the arrival and departure phases of flight. Air traffic controllers optimize the arrival and departure portion of flight by sequencing and spacing aircraft on final approach and coordinating arrival and departure air traffic with adjacent air traffic control facilities. The primary factor in establishing spacing and sequencing is the principle of "first come, first served". Other factors may include emergencies, presidential movement, lifeguard, etc. Controllers apply separation standards to achieve efficient use of airports and the navigable airspace between them.<br><br>Traffic Management Coordinators (TMCs) establish initial traffic management planning and anticipated flow rates using arrival/departure rates and current/anticipated airport conditions. TMC functionality is distributed throughout the NAS to traffic management units at Air Route Traffic Control Centers (ARTCCs), high-activity Terminal Radar Approach Control (TRACON) facilities, and at the highest-activity airport traffic control towers (ATCTs). Each plays a role in arrival and departure sequencing, depending upon the current conditions. The TRACON plays a major role in the spacing and sequencing in the terminal area. Arrival traffic is sequenced by using speed control and vectoring until cleared for the appropriate approach. Departures are handled in a similar manner with speed control and vectoring until transitioned to the en route environment. Additionally the Departure Spacing Program (DSP) evaluates aircraft flight plans at participating airports, models projected aircraft demand at shared departure fixes, and provides windows |

of departure times to controllers based on projected fix crossing times.

In performing traffic synchronization functions, controllers receive input from various sources such as, voice and data communications, and weather and automation systems. Voice inputs include Pilot Reports (PIREPS) via radio from aircraft, coordination air traffic control towers, other TRACON positions, adjacent ATC facilities, Traffic Management Unit (TMU), and the TRACON area supervisor.

Data inputs include track and weather data from Airport Surveillance Radar (ASR) and Air Traffic Control Beacon Interrogator (ATCBI)- Model 5/Mode S, and intent/flight plan data from the Host Computer System (HCS). The controller may also enter information directly.

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 90 / 2 |

---

Identifier: 104115

Name: Current Tactical Management Of Flow in the En Route for Arrivals/Departures

Description: Departure: Tactical Terminal Operations. The Air Traffic Control Tower (ATCT) Local Controller instructs the pilot, after he/she takes off from a towered airport, to contact the Terminal Radar Approach Control (TRACON) Departure Controller for further departure information. The departure controller monitors the aircraft and provides air traffic control services using flight plan information, weather, and radar information from a ground-based network of radar, communications, and automation systems.

Arrival: Before reaching the TRACON boundaries, Air Route Traffic Control Center (ARTCC) controllers establish inbound flows of aircraft over specified arrival fixes. During heavy volume, ARTCC controllers are responsible for sequencing aircraft to cross specific fixes at specific times. This process is called metering. The objective is to set up adequate spacing as the aircraft approach the En Route sector area or near the airport in order to maximize capacity. To achieve required miles-in-trail spacing, or to move each aircraft over the arrival fix to meet a required time of arrival, the estimated time of arrival, or a scheduled time of arrival, the controller may instruct an aircraft to reduce or increase speed; vector an aircraft through a series of turns; or have an aircraft enter a holding pattern. At selected ARTCCs, the Traffic Management Advisor (TMA) enhances traffic flow to airports by providing en route controllers and traffic managers arrival scheduling tools to synchronize traffic.

The ARTCC air traffic controllers control arriving aircraft that enter the ARTCC from an adjacent ARTCC or depart from feeder airports within the ARTCC. On the basis of the current and future traffic flow, the Traffic Management Coordinator (TMC) creates a plan to deliver the aircraft, safely separated, to the TRACON at a rate that fully subscribes, but does not exceed, the capacity of the TRACON and destination airport.

The TMC's plan consists of sequences and Scheduled Time of Arrival(STA) at the meter fix, which consists of published points that lie on the ARTCC/TRACON boundary. The ARTCC air traffic controller issues clearances to aircraft so that they cross the meter fixes at the STA specified in the

TMC's plan.

Aircraft descend through the airspace and are transferred from high to low sectors in the ARTCC to arrival controllers in the TRACON and on to local controllers in the tower.

Pilots follow ATC instructions while stepping down through altitudes, being queued into landing order by a team of controllers who make decisions based on any number of local conditions and parameters. When reporting on the frequency of the arrival controller, the pilot calls out the aircraft identification, current altitude, and the altitude to which the aircraft is cleared. The controller verifies the altitude based on a comparison of the pilots reported altitude and the alphanumeric readout on the controller's display. The aircraft is then sequenced to join the arrival flow with other aircraft that entered the TRACON airspace.

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 88 / 2 |

---

| | |
|---|---|
| Identifier: | 104117 |
| Name: | Improved Management of Arrival/Surface/Departure Flow Operations |

Description:

This Operational Improvement (OI) integrates advanced Arrival/Departure flow management with advanced Surface operation functions to improve overall airport capacity and efficiency. Air Navigation Service Provider (ANSP) automation uses arrival and departure-scheduling tools and four dimensional trajectory (4DT) agreements to flow traffic at high-density airports. This includes the integration of departure scheduling from multiple airports into the overhead stream, the assignment of arrival and departure runways to maximize the use of available runways at an airport, and runway configuration management with airspace configuration management to optimize the use of surface and airspace capacity when changing a runway configuration. Automation incorporates Traffic Management Initiatives (TMIs), current and forecasted conditions (e.g., weather), airport configuration, user provided gate assignments, requested runway, aircraft wake characteristics, and flight performance profiles. ANSP, flight planners, and airport operators monitor airport operational efficiency and make collaborative real-time adjustments to schedules and sequencing of aircraft to optimize throughput.

Arrival and departure flows and surface operations are more effectively planned and managed through the integration of current flight plans as well as real-time airborne and surface trajectory information into Air Navigation Service Provider (ANSP) decision support automation tools. These decision support tools enable ANSP flow managers to work collaboratively with flight operators and with ANSP controllers to effectively manage high-capacity arrival and departure flows in the presence of various weather conditions. Automation provides optimal departure scheduling and staging and arrival sequencing based on aircraft wake and airborne performance characteristics.

| | |
|---|---|
| Benefits: | ·Improved efficiency<br>·Reduced fuel burn, airport noise, and emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2015 - 2018 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Apr-2010 by David Bartlett |
| ID / Revision: | 82 / 9 |

---

| | |
|---|---|
| Identifier: | 104120 |
| Name: | Point-in-Space Metering |
| Description: | ANSP uses scheduling tools and trajectory-based operations to assure smooth flow of traffic and increase the efficient use of airspace.<br>Point-in-space metering can be associated with a departure fix, arrival fix, or any other point-in-space, such as airspace boundaries or other flow converging points. This will mitigate the impact of potential delay situations, such as those caused by weather and congestion. Decision support tools will allow traffic managers to develop scheduled arrival times for constrained resources and allow controllers to manage aircraft trajectories to meet the scheduled meter times. |
| Benefits: | ·Increased capacity<br>·Improved efficiency<br>·Reduced fuel burn and engine emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2012 - 2016 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Integration Managers Group - AJP-A3 |

Update Date: 26-Apr-2010 by David Bartlett

ID / Revision: 89 / 9

---

Identifier: 104121

Name: Automated Negotiation/Separation Management

Description: Trajectory management is enhanced by separation management automation that negotiates with properly equipped aircraft and adjusts individual aircraft Four-Dimensional Trajectories (4DTs) to provide efficient trajectories, manage complexity, and ensure separation assurance.

Negotiating with aircraft and adjusting individual 4DT trajectories synchronizes or restricts access to airspace, tactically resolves conflicts among aircraft, and avoids weather, special use airspace, terrain, or other hazards. The ANSP Separation Management function is fully automated and manages separation by negotiating conflict-driven updates to the 4DT agreements with the aircraft. This evolution, required to maximize capacity and en route throughput, allows flexibility for higher density of operations thus higher capacity, as well as a decrease in human errors in trajectory negotiation and data entry. This Operational Improvement requires a Policy/Implementation Decision to determine appropriate roles/responsibilities allocated between humans/automation and air/ground.

Benefits:
·Increased efficiency
·Enhanced capacity
·Increased access
·Increased user-preferred trajectories

Time Frame: Far Term

Earliest IOC - Latest IOC: 2023 - 2030

Solution Set(s): Initiate Trajectory Based Operations

Service: TM-Synchronization

Capability: Airborne

Lead Organization: Joint Planning and Development Office - AJP-C

Update Date: 16-Feb-2010 by David Bartlett

ID / Revision: 84 / 8

---

Identifier: 104122

Name: Integrated Arrival/Departure Airspace Management

| | |
|---|---|
| Description: | New airspace design takes advantage of expanded use of terminal procedures and separation standards. This is particularly applicable in major metropolitan areas supporting multiple high-volume airports. This increases aircraft flow and introduces additional routes and flexibility to reduce delays. ANSP decision support tools are instrumental in scheduling and staging arrivals and departures based on airport demand, aircraft capabilities, gate assignments and improved weather data products.<br><br>This capability expands the use of terminal separation standards and procedures (e.g., 3 nm, degrees divergence) within the newly defined transition airspace. It extends further into current en route airspace (horizontally and vertically). A redesign of the airspace will permit a greater number of RNAV and RNP procedures within the transition airspace to allow for increased throughput. Extended application of terminal procedures and separation standards allows greater flexibility for traffic to be re-routed during severe weather and other disruptions to normal flows. Certain routes can be bi-directional and are used for either arrival or departure, depending on the traffic situation and the location of the severe weather. |
| Benefits: | * Maximizes throughput<br>* Improved efficiency<br>* Reduced flight time<br>* Reduced noise<br>* Reduced fuel burn and engine emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2016 - 2019 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Apr-2010 by David Bartlett |
| ID / Revision: | 87 / 9 |

---

| | |
|---|---|
| Identifier: | 104123 |
| Name: | Time Based Metering Using RNAV and RNP Route Assignments |
| Description: | RNAV, RNP, and time-based metering provide efficient use of runways and airspace in high-density airport environments. RNAV and RNP provide users with more efficient and consistent arrival and departure routings and fuel-efficient operations. Metering automation will manage the flow of aircraft to meter fixes, thus permitting efficient use of runways and airspace.<br><br>Building on increased capacity in terminal separation procedures, time-based metering will facilitate efficient arrival and departure flows. This will be accomplished using RNAV and RNP routings, coupled with meter fix crossing times. These will be issued to the flight crew via voice or data communications for input into the Flight Management System (FMS). Arrivals will be issued a RNAV routing to link arrival procedures to designated runways. Aircraft will navigate from en route to approach and landing phases with minimal adjustments (i.e., speed adjustments) or changes to flight trajectories by Air Navigation Service Provider (ANSP).<br><br>Departures will be issued clearances that specify departure routings linked from RNAV routes into the en route phase of flight. This will reduce ANSP and flight crew workload, providing flexibility as well as maximizing arrival and departure throughput at high-density airports. |

| | |
|---|---|
| Benefits: | * Improved efficiency<br>* Increased capacity<br>* Reduced fuel burn and engine emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2012 - 2016 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 23-Mar-2010 by David Bartlett |
| ID / Revision: | 83 / 7 |

---

| | |
|---|---|
| Identifier: | 104124 |
| Name: | Use Optimized Profile Descent |
| Description: | Optimized Profile Descents (OPDs) permit aircraft to remain at higher altitudes on arrival to the airport and use lower power settings during descent. OPD arrival procedures will decrease noise and be more fuel-efficient. The air navigation service provider procedures and automation accommodate OPDs when operationally advantageous.<br><br>An OPD, in its optimal form, is an arrival where aircraft is cleared to descend from cruise altitude to final approach using the most economical power setting at all times. Based on published arrival procedures at final approach, aircraft begin a continuous rate of descent using a window of predetermined height and distance. Thrust may be added to permit a safe, stabilized approach-speed and flap-configuration down a glide slope to the runway.<br><br>As an initial step, conventional or RNAV STARs can be defined with vertical constraints incorporated as crossing restrictions. Careful selection of constraints allows most aircraft FMS VNAV systems to calculate a continuously descending flight path, although the flight path may require a slightly non-optimal power setting. In addition, static spacing guidance, based on weight class and winds, as well as speed commands for descending traffic, allows STAR to be used with minimal impact to airport throughput, although with a slight additional environmental penalty compared to the ideal STAR OPD.<br><br>At busy airports, achieving full fuel/emissions/noise benefits will be difficult without impacting capacity, unless advanced avionics and/or ground capabilities, and perhaps larger-scale airspace redesign are added. |
| Benefits: | *Reduced noise<br>*Reduced fuel-burn and engine emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2010 - 2017 |

| | |
|---|---|
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 27-Jan-2010 by Ward Huston |
| ID / Revision: | 85 / 7 |

---

| | |
|---|---|
| Identifier: | 104125 |
| Name: | Integrated Arrival/Departure and Surface Traffic Management for Metroplex |
| Description: | Metroplex traffic flow is more efficiently managed through arrival/departure and surface scheduling automation, integrated with all available constraint information, including weather impacts, optimizing traffic throughput by eliminating potential gaps in unused capacity, thereby increasing regional/metroplex capacity.<br><br>Adjustments to the integrated airspace RNP routings are dynamically designed, validated by automated tools, and uplinked via data communications to participating aircraft to meet changing weather conditions and/or congestion. Metroplex trajectory management assigns each arriving aircraft to an appropriate runway, arrival stream, and place in sequence. Departing aircraft are assigned an appropriate runway and a departure time based on efficient merging and spacing with aircraft departing other metroplex terminals, as well as those already in overhead streams. Surface scheduling automation integrates arriving and departing aircraft and provides runway and taxi movement to optimize all surface movement. Data communications enables the Air Navigation Service Provider (ANSP) to maximize access for all traffic, while adhering to the principle of giving advantage to those aircraft with advanced capabilities |
| Benefits: | Increased capacity<br>Increased efficiency |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2020 - 2023 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 23-Mar-2010 by David Bartlett |

ID / Revision: 81 / 7

---

Identifier: 104126

Name: Trajectory-Based Management - Gate-To-Gate

Description: All aircraft operating in high density airspace are managed by Four Dimensional Trajectory (4DT) in En Route climb, cruise, descent, and airport surface phases of flight to dramatically reduce the uncertainty of an aircraft's future flight path in terms of predicted spatial position (latitude, longitude, and altitude) and times along points in its path.

Integrating separation assurance and traffic management time constraints (e.g., runway times of arrival, gate times of arrival), this end state of 4DTbased capability calculates and negotiates 4DTs, allows tactical adjustment of individual aircraft trajectories within a flow, resolves conflicts, and performs conformance monitoring by Air Navigation Service Providers (ANSPs) to more efficiently manage complexity, ensure separation assurance, and enhance capacity and throughput of high density airspace to accommodate increased levels of demand. This will be enabled by the trajectory exchange through data communications, as well as many new surface automation and 3D (x, y, and time) trajectory operations.

In trajectory-based airspace, user preferences are accommodated to the greatest extent possible, and trajectories are constrained only to the extent required to accommodate demand or other national concerns, such as security or safety. Performance-based services are conducted for differing types of operations based on anticipated traffic characteristics. The ANSP role evolves into managing trajectory-based airspace by maintaining largely conflict-free, user-preferred flows. This evolution allows the flexibility required to maximize capacity and en route throughput.

Benefits: Increased efficiency
Increased capacity

Time Frame: Far Term

Earliest IOC - Latest IOC: 2025 - 2030

Solution Set(s): Initiate Trajectory Based Operations

Service: TM-Synchronization

Capability: Airborne

Lead Organization: Joint Planning and Development Office - AJP-C

Update Date: 16-Feb-2010 by David Bartlett

ID / Revision: 80 / 7

---

Identifier: 104127

Name: Automated Support for Conflict Resolution

| | |
|---|---|
| Description: | ANSPs, supported by automation, remain responsible for separation management. Conflict resolution is enhanced by automated assistance to probe pilot trajectory change requests with properly equipped aircraft operators to resolve conflicts.<br><br>Decision support tools identify conflicts and provide alternatives to the Air Navigation Service Provider to resolve the conditions. These alternatives include proposed trajectories, or intent data, that are exchanged with the operator via data communications, allowing solutions that are not subject to constraints imposed by voice.<br><br>Ground-based automation provides trial planning using intent data, and conflict detection and resolution to probe Four-Dimensional Trajectories (4DTs) in en route trajectory-based operations. The conflict resolution (trajectory change) would then be relayed to the pilot/aircraft operator. The aircraft operator must acknowledge receipt and acceptance of the trajectory change. |
| Benefits: | Expanded alternatives for conflict resolution<br>Increased Efficiency<br>Enhanced Safety |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2018 - 2025 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Apr-2010 by David Bartlett |
| ID / Revision: | 133 / 6 |

---

| | |
|---|---|
| Identifier: | 104128 |
| Name: | Time-Based Metering in the Terminal Environment |
| Description: | Aircraft are time-based metered inside the terminal environment, enhancing efficiency through the optimal use of terminal airspace and surface capacity. ANSP automation develops trajectories and allocates time-based slots for various points (as needed) within the terminal environment, applying RNAV route data and leveraging enhanced surveillance, data communications, and closely spaced parallel, converging, and intersecting runway capabilities (where applicable).<br><br>This OI extends current metering capabilities into the terminal environment and furthers the pursuit of end-to-end metering and trajectory-based operations. It also supports capabilities designed to expand the use of terminal separation standards in transition airspace, and solidifies the foundation for future advanced airborne-based applications that will depend upon ground-based automation to maintain the complete sequence of aircraft into and out of high density terminal locations. |
| Benefits: | Increased Efficiency<br>Increased Capacity |

| | |
|---|---|
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2015 - 2018 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |
| Service: | TM-Synchronization |
| Capability: | Airborne |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Apr-2010 by David Bartlett |
| ID / Revision: | 134 / 5 |

---

Identifier: 104201

Name: Current Surface Traffic Management

Description:

The fundamental purpose of surface traffic synchronization is to get aircraft from the departure gates to the active runway and vice versa in the minimum amount of time without an incident. Surface synchronization of aircraft arriving or departing an airport while they are operating on the airport surface is the responsibility and function of local and ground controllers in the airport traffic control tower and, in some cases, the function of ramp towers. This includes controlling aircraft exiting the runway after touchdown, granting taxi clearance for arrivals and departures, controlling vehicles operating on or crossing taxiways and runways, holding aircraft for departure or for an available gate, granting takeoff clearances, ensuring runway clearance for runway operations, and providing safe taxiway flow management. At controlled airports, the process begins for departure aircraft with the pilot's request for a clearance to move the aircraft from its gate or parking position on the ramp. At major airports where air carriers control large numbers of gates, agreements are in place between the carrier and Federal Aviation Administration (FAA) for control of parking or ramp areas. In these areas, a ramp coordinator designated by the airline directs the movement of aircraft from the gates and on the ramp to a specific point that is defined by the agreement. (At some other airports, personnel that work for the airport operator perform this ramp coordinator function.) At airports where there is no such agreement, both the pilot and ground service personnel work together to ensure safe movement of the aircraft away from the gate and up to the point where air traffic control assumes movement control.

The process of surface movement begins when the aircraft is pushed back or taxies away from the gate. When the aircraft approaches the common movement area beyond the gate and parking area, the aircraft receives further air traffic control (ATC) taxi instructions. When the taxi clearance is issued, the aircraft taxies onto the movement area where FAA ground controllers direct aircraft through the airport's system of taxiways that lead to the assigned departure runway. There are variations on this scenario. The ground controller directs movement to specific taxiways and runways based on the most efficient flow of traffic. The controller may issue a "taxi-to" instruction; this is a clearance through any runway or taxiway intersections up to a specific point short of the active runway. A "hold short' instruction may be issued, which requires the pilot to stop at an intersection of other point and await further clearance.

Surface Movement Advisor (SMA) provides aircraft arrival information to airlines to augment decision making for surface movement of aircraft, and it is used at a number of major airports. Airline/airport ramp tower personnel and Airline Operations Center (AOC) personnel at participating SMA airports receive a one-way feed of Automated Radar Terminal System III(ARTS) data with current traffic information. Specifically, airline/airport personnel receive updated terminal airspace information that they use to accurately estimate and prepare for actual aircraft touchdown. This information supports gate and ramp operations, helps prevent airport gridlock, and reduces taxi delays. This real-time status information, including aircraft position updates, is conveyed to the aircraft while it is in Terminal Radar Approach Control (TRACON) airspace. Department of Defense and "sensitive" aircraft information are filtered out. Aircraft position updates and estimated touchdown times provide airline/airport personnel with a real time position on an arrival, enabling more efficient scheduling of ground crew and gate-support resources. Increased collaboration between tower controllers and ramp personnel can occur if a gate is not available and ramp personnel need to request that ATC hold an arrival aircraft on the airport movement area.

Additional systems and equipment to facilitate surface traffic management include the Airport Movement Area Safety System (AMASS) and Airport Surface Detection Equipment (ASDE).

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | TM-Synchronization |
| Capability: | Surface |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 19 / 2 |

---

| | |
|---|---|
| Identifier: | 104206 |
| Name: | Full Surface Traffic Management with Conformance Monitoring |
| Description: | Efficiency and safety of surface traffic management is increased, with corresponding reduction in environmental impacts, through the use of improved surveillance, automation, on-board displays, and data link of taxi instructions.<br><br>Equipped aircraft and ground vehicles provide surface traffic information in real-time to all parties of interest. A comprehensive view of aggregate traffic flows enables ANSP to project demand; predict, plan, and manage surface movements; and balance runway assignments, facilitating more efficient surface movement and arrival and departure flows. Automation monitors conformance (position and path) of surface operations and updates the estimated departure clearance times. Surface optimization automation includes activities such as runway snow removal, aircraft de-icing, and runway configuration |
| Benefits: | ·Increased airport efficiency<br>·Enhanced surface safety<br>·Improved shared situational awareness<br>·Decreased emissions and airport noise levels |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2018 - 2024 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |

Service: TM-Synchronization

Capability: Surface

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 26-Apr-2010 by David Bartlett

ID / Revision: 20 / 8

---

Identifier: 104207

Name: Enhanced Surface Traffic Operations

Description: Data communication between aircraft and ANSP is used to exchange clearances, amendments, and requests. At specified airports, data communications is the principle means of communication between ANSP and equipped aircraft.

Terminal automation provides the ability to transmit automated terminal information, departure clearances and amendments, and taxi route instructions via data communications, including hold-short instructions. The taxi route instruction data communication function reduces requests for progressive taxi instructions. Benefits arising from this capability, in conjunction with other NAS investments, include enhanced airport throughput, controller efficiency, enhanced safety, as well as reduced fuel-burn and emissions.

At the outset, the current system will be expanded to include provision of initial and revised departure clearances directly to the aircraft. Initial and revised taxi route instructions will be added, replacing today's use of voice to accomplish these activities. As a second step, Aeronautical Telecommunication Network (ATN) based capabilities will be added, replacing much of today's system.

Benefits:
*Improved efficiency
*Reduced frequency congestion
*Enhanced safety due to avoided readback / hearback operational errors

Time Frame: Mid Term

Earliest IOC - Latest IOC: 2014 - 2018

Solution Set(s): Increase Flexibility in the Terminal Environment

Service: TM-Synchronization

Capability: Surface

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 27-Jan-2010 by Ward Huston

ID / Revision: 17 / 7

| | |
|---|---|
| Identifier: | 104208 |
| Name: | Enhanced Departure Flow Operations |
| Description: | Enhancements to surface traffic management incorporate taxi instructions, surface movement information, and aircraft wake category to enhance departure flow operations. Clearances are developed, delivered, monitored and provided in digital data or textual format that is used by the flight deck display to support taxi, takeoff and departure flows in all conditions. At high-density airports clearances and amendments, requests, NAS status, airport flows, weather information, and surface movement instructions are issued via data communications.<br><br>Surface decision support and management systems use ground and airborne surveillance and a scheduling and sequencing system to develop and maintain schedules of departing aircraft within a defined time horizon. Information is sent to participating aircraft and the air navigation service provider via data communications or voice and adjustments are made to push back times, taxi instructions, etc. to maintain schedules. Schedules are built to optimize runway utilization and incorporate information such as gate assignments, wake category, and slots for departing aircraft.<br><br>Surface movement and management systems forecast when an aircraft will be ready to pushback and take-off using various airline operations center inputs (e.g., wake category, mechanical condition, percentage loaded, etc.). Surface surveillance detects the actual block-out event and monitors the aircraft's movement. Decision support tools provide forecast take-off times to surface movement and flow management systems to schedule slots in the departure stream and manage/control take-off times to achieve efficient flows. |
| Benefits: | ·Increased efficiency<br>·Reduced runway incursions<br>·Reduced emissions |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2015 - 2020 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |
| Service: | TM-Synchronization |
| Capability: | Surface |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 23-Mar-2010 by David Bartlett |
| ID / Revision: | 16 / 8 |

| | |
|---|---|
| Identifier: | 104209 |
| Name: | Initial Surface Traffic Management |

| | |
|---|---|
| Description: | Departures are sequenced and staged to maintain throughput. ANSP uses automation to integrate surface movement operations with departure sequencing to ensure departing aircraft meet departure schedule times while optimizing the physical queue in the movement area. ANSP automation also provides surface sequencing and staging lists for departures and average departure delay (current and predicted).These function will incorporate traffic management initiatives, separation requirements, weather data, and user preferences, as appropriate.<br><br>ANSP automated decision support tools integrate surveillance data, weather data, departure queues, aircraft flight plan information, runway configuration, expected departure times, and gate assignments. Local collaboration between ANSP and airport stakeholders improves information flow to decision support as well as the ability for aircraft operators to meet their operational and business objectives. |
| Benefits: | * Improved efficiency<br>* Reduced fuel burn, airport noise, and engine emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2010 - 2017 |
| Solution Set(s): | Increase Arrivals/Departures at High Density Airports |
| Service: | TM-Synchronization |
| Capability: | Surface |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 31-Mar-2010 by David Bartlett |
| ID / Revision: | 18 / 9 |

---

| | |
|---|---|
| Identifier: | 105101 |
| Name: | Current Long Term Planning |
| Description: | Long-term planning is necessary to match air traffic system capacity with user demand. There are various changes that occur in the National Airspace System (NAS) and in the airline industry that place increased demand on system capacity. The duration of these changes can be one day, several days, several weeks, or until further notice. These changes are often known months or even years in advance of the occurrence. This timeframe allows strategic planning to minimize adverse impacts to users. Long-term planning should take a systemic view of sectors, NAS assets, and workload, because lack of automation to collect, analyze, and evaluate is not available today.<br><br>Airline schedule changes occur frequently. These changes are generally market driven and are not necessarily known to the FAA far in advance. The FAA asks for, and is generally given, advance notice of large-scale changes to airline schedules. An example of this is the bi-annual change to and from Daylight Savings Time.<br><br>Special procedures may be established for a location to accommodate abnormally large traffic demands (e.g., Indianapolis 500 Race, Kentucky Derby, Experimental Aircraft Association fly-ins) or a significant reduction in airport capacity for an extended period (e.g., due to airport runway or taxiway closures for airport construction). These special procedures, called Special Traffic Management Programs, may remain in effect until the event is over or local traffic management procedures are implemented that can handle the situation.<br><br>The Air Traffic Control Systems Command Center (ATCSCC), Airline Operations Centers (AOC), and field facilities constantly evaluate the possible impact to the NAS during the above occurrences. The Central Altitude Reservation Facility (CARF), located at the ATCSCC, is coordinated with to determine what military routings are involved with the impacted airspace. When necessary, the planned changes are modeled against various remedies to mitigate the impacts of the change. |

Various modeling tools are available to the FAA and the AOCs to analyze the effect of changes that are planned in the NAS. Some of these tools are automated and others are manual. Host Computer System (HCS) and Enhanced Traffic Management System (ETMS) recorded data provide the inputs for modeling. The result of these modeling efforts can forecast the capacity requirements resulting from planned changes. The following procedures are modeled for effectiveness:

Airport-specific programs designed to deliver a certain hourly amount of arrival aircraft to an airport. Miles-In-Trail restrictions models are accomplished for specific airports, airways, facilities, or sectors. Coded Departure Routes (CDR) or alternate routings, which allow aircraft to maneuver around impacted airspace or accommodate sector-loading efforts, are also modeled.

The FAA and the affected stakeholders use a Collaborative Decision Making (CDM) process once modeling efforts have been accomplished and analyzed. The FAA has responsibility for managing the NAS; however, the CDM process almost always results in consensus among stakeholders about proposed resolutions.

Very large special events are modeled and coordinated with multiple inter- and intra- governmental stakeholders. The Olympics are an example of this type event. All organizations within the FAA are represented in the planning efforts. Additionally, U. S. Customs, the FBI, Homeland Security and the Secret Service are involved, as well as local police and governments.

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | TM-Strategic Flow |
| Capability: | Long Term Planning |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 23 / 2 |

---

| | |
|---|---|
| Identifier: | 105104 |
| Name: | NAS Wide Sector Demand Prediction and Resource Planning |
| Description: | An integrated model of NAS wide capacity resource drivers and demand information from collaborative decision making (CDM) are combined in one integrated decision support tool. |

The model includes the capacity impact of key resource constraints: (1) gate, airspace or runway blockages (for safety, security or weather); (2) fleet mix and performance characteristics; (3) flow structure which modifies the complexity of the operation; and (4) workload. Strategic resources (e.g., airspace, sectors, personnel, facilities, NAS systems) are modeled in parallel with systemic changes in demand due to increases in air traffic, seasonality, or city pair business case decisions. As part of the continuous evaluation process, future traffic loads are modeled against various solutions to mitigate adverse impacts to users.

The air navigation service provider (ANSP) and stakeholders use decision management systems to achieve consensus once NAS-wide modeling efforts are accomplished and analyzed. This includes proactively adjusting airspace configurations based on projections of shift in demand due to seasonal changes, as well as city pair business adjustments by National Airspace System (NAS) users. Strategic long-term planning with dynamic and flexible airspace and airports minimizes adverse impacts to users. ANSP is responsible for managing the NAS; the CDM process results in consensus among the stakeholders about proposed resolutions.

| | |
|---|---|
| Benefits: | ·Enhanced efficiency<br>·Improved predictability<br>·Increased flexibility |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2013 - 2020 |
| Solution Set(s): | Transform Facilities |
| Service: | TM-Strategic Flow |
| Capability: | Long Term Planning |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 21 / 7 |

---

| | |
|---|---|
| Identifier: | 105201 |
| Name: | Current Flight Day Management |
| Description: | Every day the performance of the National Airspace System (NAS) is monitored and assessed on a continuous basis. The primary responsibility for performance assessment is assigned to the David J. Hurley Air Traffic Control System Command Center (ATCSCC) located in Herndon, Virginia. Assessments include determining airspace and airport capacity and possible constraints on the system. Various systems along with Traffic Management (TM) units in all the major facilities are utilized to collect data to assist in the analysis. Key personnel at various facilities and the user community collaborate on decisions to mitigate constraints on the system. This process is called Collaborative Decision Making (CDM).<br><br>The TM specialist at the ATCSCC collects initial runway configurations and airport acceptance rates from the TM coordinators at the associated Air Route Traffic Control Centers (ARTCC) or Terminal Radar Approach Control (TRACON) facilities. The current airport acceptance rate is determined by runway configuration, weather, equipment availability, and runway/taxiway closures. This information is collected for the busiest commercial airports in the NAS. This collection of data can occur via the voice switch systems at the various facilities, or via Enhanced Traffic Management System (ETMS) equipment. |

ARTCC Weather Service Unit (CWSU) personnel derive initial aviation weather data for the day from previous day forecasts and a first observation of the current day through the weather and radar processor. Subsequent aviation weather data is collected from numerous sources. Each large Airline Operations Center (AOC) and air cargo operations center has their own meteorological staff, or they purchase weather products from private vendors. Most AOCs have dedicated CDM workstations used in the CDM process. All FAA ARTCC facilities have a CWSU staffed by National Weather Service meteorologists. The ATCSCC also has its own weather personnel. These weather professionals combine their levels of expertise to produce a consensus weather forecast product for use by all participants in the CDM process. The product is referred to as the Collective Convective Forecast Product (CCFP) and is published mid-morning to all CDM participants. Additional types of information are shared using the NAS Status Information system. Constraints to the en route airspace system, the airspace between the airports, are analyzed. These constraints include weather, military activity, space vehicle launches and recoveries, VIP movements, and other restrictions to airspace use. Based on the en route constraints, predicted en route sector loading is analyzed. The objective of this analysis is to route aircraft around or through constrained airspace in an orderly manner and prevent en route sector overload.

Equipment outages can adversely impact the capacity of the NAS. The National Operations Command Center (NOCC) located at the ATCSCC tracks unscheduled outages and coordinates the scheduling of planned outages. Airway facilities personnel, knowledgeable about equipment requirements, staff the NOCC. The NOCC provides equipment status information to the National Operations Manager for use in NAS performance assessment.

After all pertinent data is collected and analyzed, modeling of various traffic management initiatives is accomplished by the ATCSCC and the impacted ARTCCs, TRACONs, stand alone Air Traffic Control Towers, and/or AOC. The intent of the modeling is to mitigate each constraint to the NAS using the minimum restriction necessary to relieve the situation. The modeling can show the impact of the proposed restriction on the sectors that would work the rerouted traffic. Modeling is accomplished using methods from simple chalkboard drawings, or by using computer-modeling programs such as Post Operation Evaluation Tool (POET). Additionally, each initiative must be integrated with other restrictions currently in place for overall system effectiveness. The following are the initiatives available to planners to mitigate system constraints:

Airport specific programs are designed to deliver certain hourly numbers of arrival aircraft to an airport. The Flight Schedule Analyzer (FSA) on a real time basis analyzes Ground Delay Programs. Ground stops are airport specific programs, generally short term in nature, which stops, on the ground, some or all arrivals to a specified airport or metropolitan area. Miles-In-Trail are the most widely used restriction to slow and spread out traffic. This type restriction can be airport, airway, facility, or sector specific. This type restriction usually has time and altitude parameters.

Coded Departure Routes provide alternate departure routings to allow aircraft to enter the NAS on routes that avoid impacted airspace or to accommodate sector loading reduction efforts. Additionally the National Playbook contains published routings to and from certain airports utilized to bypass constricted airspace. A Severe Weather Avoidance Plan publishes routings circumventing geographic areas that are being impacted by severe weather.

Other diversion techniques include: routing aircraft through less congested, lower altitude sectors or TRACON airspace when optimum higher altitudes are saturated; and severe weather diversion, where aircraft are diverted from their planned destinations to alternate destinations.

The CDM process uses these techniques for strategic planning and requires that all participants utilize common, agreed upon data. The CCFP and the FSA data are examples of necessary common data. This data is based on the FAAs ETMS and made available to all users through Web-based technology using a privately-owned network called CDMnet.

Once the constraints to the capacity of the NAS are defined, analyzed, and possible solutions have been modeled by the ATCSCC, FAA field facilities and the AOCs participate in a Strategic Planning Teleconference (SPT) to determine a course of action. The SPT is scheduled on a periodic basis, the frequency is determined by operational circumstances impacting the participants. Prior to the SPT, coordination between facilities and users to explore common strategies is required. The ATCSCC sets the agenda for the SPT and requests participation from involved stakeholders. The involved stakeholders are determined by the airspace involved, the users impacted, and FAA facilities that may be impacted by various solutions.

The SPT is a collaborative effort in which all participants are actively seeking the most advantageous mitigation to an airport or airspace constriction in the NAS. The length of the SPT depends on the number of constraints in the system and the complexity of the situations and resolutions. The ATCSCC conducts the SPT and, in theory, is there to resolve conflicts in proposed solutions. In practice, the CDM process almost always results in consensus among the stakeholders about proposed resolutions.

After the SPT is complete the ATCSCC publishes a Strategic Plan of Operations (SPO). The SPO contains the written results of the CDM process and is used by all stakeholders to execute the plan.

Other Actions

Tactical operation responses to constraints to the NAS are coordinated by the ATCSCC Severe Weather Group. This group reacts to unscheduled events such as pop-up thunderstorms and facility/navaid outages. Their available actions are the same as the strategic planners. A tactical action by this group may be incorporated in the next SPT process. ATCSCC is tasked with monitoring compliance with both the strategic and tactical restrictions currently in use in the NAS.

Airport resources are managed by slot allocation, a process by which arrival times are planned based on all aircraft demands for service. This process is used daily at certain airports and during certain special events at other airports. The ATCSCC controls these programs. For special event purposes at certain airports, pilots request and obtain approval for arrival and/or departure reservations or slots utilizing an interactive computer system. This system is called the Computer Voice Reservation System.

Diversion recovery, if the NAS becomes restricted to the level requiring the diverting of aircraft to airports other than their original destination, is a plan to recover the aircraft to a location that meets airline-scheduling needs, but usually to the original destination. This plan ensures that a flight does not suffer a diversion as well as additional delays. This planning involves close coordination between the ATCSCC and the associated AOC.

Benefits: Current operations are provided in the NAS.

Time Frame: As Implemented

Earliest IOC - Latest IOC: -

Solution Set(s): None

Service: TM-Strategic Flow

Capability: Flight Day Management

Lead Organization: Not Assigned - Not Assigned

Update Date: 21-Jan-2010 by David Bartlett

ID / Revision: 122 / 2

---

Identifier: 105207

Name: Full Collaborative Decision Making

Description: Timely, effective, and informed decision-making based on shared situational awareness is achieved through advanced communication and information sharing systems.

Stakeholder decisions are supported through access to an information exchange environment and a transformed collaborative decision making process that allows wide access to information by all parties (whether airborne or on the ground), while recognizing privacy and security constraints. Decision-makers request information when needed, publish information as appropriate, and use subscription services to automatically receive desired information through the net-centric infrastructure service.

Net-centricity ensure a robust, globally interconnected network environment in which information is shared in a timely and consistent manner among users, applications, and platforms during all phases of aviation transportation efforts. This information environment enables more timely access to information and increased situational awareness while providing consistency of information among decision-makers. A mixture of near-real-time and post-ops analysis from both the air navigation service provider and aircraft operators is shared.

With nearly instant feedback on the system-wide implications of their plans, decision-making can be allocated to the person in the best position to make safety and efficiency call, including an increased level of decision-making by the flight crew and flight operations centers. Decision-makers have access to options analysis DST which performs fast-time simulations to assess the NAS wide implications of any proposed changes in trajectory on other flight operations. Decision-makers have more information about relevant issues, decisions are made more quickly, required lead times for implementation are reduced, responses are more specific, and solutions are more flexible to change. To ensure locally developed solutions do not conflict, decision-makers are guided by NAS-wide objectives and test solutions to identify interference and conflicts with other initiatives.

| | |
|---|---|
| Benefits: | ·Improved resource allocation<br>·Increased productivity<br>·Improved predictability<br>·Increased access<br>·Increased flexibility |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2017 - 2023 |
| Solution Set(s): | Improve Collaborative ATM |
| Service: | TM-Strategic Flow |
| Capability: | Flight Day Management |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 27-Jan-2010 by Ward Huston |
| ID / Revision: | 120 / 7 |

---

| | |
|---|---|
| Identifier: | 105208 |
| Name: | Traffic Management Initiatives with Flight Specific Trajectories |
| Description: | Individual flight-specific trajectory changes resulting from Traffic Management Initiatives (TMIs) will be disseminated to the appropriate Air Navigation Service Provider (ANSP) automation for tactical approval and execution. This capability will increase the agility of the NAS to adjust and respond to dynamically changing conditions such as bad weather, congestion, and system outages.<br><br>Traffic Flow Management (TFM) automation prepares TMIs appropriate to the situation at the flight-specific level. After ANSP approval, changes/amendments are electronically delivered to the controller for in-flight operations. |
| Benefits: | * Improved efficiency<br>* Increased capacity<br>* Improved predictability<br>* Reduced fuel-burn and aircraft emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2014 - 2015 |
| Solution Set(s): | Improve Collaborative ATM |
| Service: | TM-Strategic Flow |

| | |
|---|---|
| Capability: | Flight Day Management |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 27-Jan-2010 by Ward Huston |
| ID / Revision: | 119 / 7 |

---

| | |
|---|---|
| Identifier: | 105301 |
| Name: | Current NAS Performance Assessment |
| Description: | Every day the performance of the National Airspace System is monitored and assessed on a continuous basis. The primary responsibility for performance assessment is assigned to the David J. Hurley Air Traffic Control System Command Center (ATCSCC) located in Herndon, Virginia. Assessments include determining airspace and airport capacity and possible constraints on the system. Various systems including the Enhanced Traffic Management System (ETMS) along with Traffic Management Units (TMU) in all the major facilities are utilized to collect data to assist in the analysis.<br><br>After all pertinent data is collected and analyzed, modeling of various traffic management initiatives is accomplished by the ATCSCC and the impacted Air Route Traffic Control Center (ARTCC), Terminal Radar Approach Control (TRACON), stand alone Air Traffic Control Tower (ATCT), and/or Airline Operations Center (AOC). The modeling evaluates the impact of the implemented restriction on the facilities and users. Modeling is accomplished using methods from simple chalkboard drawings, or by using computer modeling programs such as the Post Operation Evaluation Tool (POET). The actual flight day results are modeled against the plan to determine effectiveness. Additionally, each implementation process must be integrated with other restrictions and constraints to determine overall system effectiveness.<br><br>Results are then fed back into future planning processes and modeling activities, which support tool development and flight day planning. |
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | TM-Strategic Flow |
| Capability: | Performance Assessment |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 3 / 2 |

---

Identifier: 105302

Name: Continuous Flight Day Evaluation

Description: Performance analysis, where throughput is constrained, is the basis for strategic operations planning. Continuous (real-time) constraints are provided to Air Navigation Service Provider (ANSP) traffic management decision-support tools and National Airspace System (NAS) users. Evaluation of NAS performance is both a real-time activity feedback tool and a post-event analysis process. Flight day evaluation metrics are complementary and consistent with collateral sets of metrics for airspace, airport, and flight operations.

ANSPs and users collaboratively and continuously assess (monitor and evaluate) constraints (e.g., airport, airspace, hazardous weather, sector workload, Navigational Aid (NAVAID) outages, security) and associated TMI mitigation strategies. Users and ANSP dynamically adjust both pre-departure and airborne trajectories in response to anticipated and real-time constraints.

ANSP, in collaboration with users, develops mitigation strategies that consider the potential constraints. A pre-defined set of alternatives is developed that maximizes airspace and airport capacity and throughput. ANSP and users use (real-time) constraint information and these mitigation strategies to increase operational predictability and throughput.

ANSP automation traffic management decision-support tools perform a post-operational assessment of NAS performance. This capability includes ANSP automation to collect and support the analysis of airspace, airport, and flight day operational data as part of a comprehensive post-flight day analysis capability applicable to multiple domains and for multiple purposes. Flight day metrics are compared with performance metrics from each element of the system (e.g., aircraft, pilot, controller, airspace). NAS and operational resources are aligned to meet anticipated demand. This improves the ANSP pre-defined shared plans.

Long-term planning functions will improve due to continuous flight day evaluation. NAS performance will be improved and decision-makers will be able to predict and plan operations based on a validated tool.

Benefits: *Improved efficiency
*Improved operational capability analysis
*Increased capacity
*Reduced fuel-burn and engine emissions

Time Frame: Mid Term

Earliest IOC - Latest IOC: 2012 - 2018

Solution Set(s): Improve Collaborative ATM

Service: TM-Strategic Flow

Capability: Performance Assessment

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 27-Jan-2010 by Ward Huston

ID / Revision: 4 / 7

---

Identifier: 106101

**Name:** Current Emergency Assistance

**Description:** Air traffic service emphasizes emergency assistance for on-airport and airborne vehicles and aircraft. The Air Route Traffic Control Centers (ARTCC) and Terminal Radar Approach Controls (TRACON) provide emergency assistance services to flights in their delegated airspace. Airport Traffic Control Towers (ATCT) provides assistance to aircraft operating on the airport surface or in the airport traffic area. The Automated Flight Service Station/Flight Service Station (AFSS/FSS) facilities help with Visual Flight Rules flights that are in contact with the En Route Flight Advisory Service position. AFSS/FSS also help find aircraft experiencing emergencies via direction finding (DF) equipment. Pilots participate in emergency assistance by relaying radio transmissions that air traffic facilities do not receive and by using the designated transponder codes to signal emergency conditions.

The ARTCCs serve as the central points for collecting information on overdue or missing Instrument Flight Rules aircraft and for coordinating with Search and Rescue on those flights. The ARTCC also conducts communications searches by distributing any necessary alert notices. In addition, the ARTCC provides direct assistance to an aircraft experiencing an emergency situation while operating in their assigned airspace. ARTCC radar controllers receive emergency information and requests for assistance via the air-to-ground radio, Voice Switch and Control System, from transponder codes as integrated by the Air Traffic Control Beacon Interrogator or Mode Select Beacon System radar, and also as relayed from other aircraft. When an aircraft declares an emergency and request to land as quickly as possible, the ARTCC radar controller uses data from the Air Route Surveillance Radar and the Display System Replacement equipment to locate suitable airports, and then relay information about the emergency to the ATCT. If there is no ATCT, the information is relayed to the airport operator. This advance information allows airfield fire fighting and rescue personnel to prepare for the arrival of the aircraft in distress. If time permits, and a flight experiencing an emergency elects to continue to its destination, the controller enters the information in the Flight Data Input/Output system. The Host Computer System processes the information and provides it to the sectors that the flight will enter, giving all the controllers the necessary information to assist the aircraft.

The Emergency Voice Communications System (EVCS) provides emergency voice communications to meet national security and emergency preparedness responsibilities dictated by Presidential Order and interagency agreements. The EVCS supports headquarters and Regional Communications Command Centers' functions for accident and incident reports, hijacks, airline crashes, aviation security matters, military activities, natural disasters, etc.

The TRACON serves a similar function for an aircraft experiencing an emergency within their delegated airspace. The TRACON radar controller uses data from the Airport Surveillance Radar and the Automated Radar Terminal System to locate suitable emergency airports, and can access more detailed information in the Automated Surface Observing System (ASOS) Controller Equipment/Information Display System. Radio and landline communication is accomplished through the Integrated Communication Switching System (ICSS), Enhanced Terminal Voice Switching (ETVS), or Rapid Deployment Voice Switch systems.

The ATCT provides emergency assistance to aircraft operating on the surface of the airport and in the tower airspace. Information is received via the Small Tower Voice Switch, ICSS, or ETVS on flights that are being transferred from either the ARTCC or the TRACON. In addition, local controllers use the Digital Bright Radar Indicator Tower Equipment, which provides a television type display of air traffic and weather data, to display emergency transponder codes. They also observe predetermined covert signals from an aircraft operating on the surface of the airport. Ground or local controllers activate crash phone circuits to alert airport rescue personnel. The ground controller assists the emergency vehicles in reaching the distressed aircraft, or in positioning equipment for optimum response. Current weather information is provided through direct reading instruments such as Low Level Wind Shear Alert System, Terminal Doppler Weather Radar, and from ASOS.

The AFSS is normally the facility on the DF net. The specialist requests that the flight transmit on its radio, the DF equipment shows the bearing of the transmission from the DF site location. If two sites can receive the transmission, the intersection of the two bearings pinpoints the exact location of the aircraft. Weather data is displayed on the flight service automation system Model 1 Full Capacity, or its replacement, the Operational and Supportability Implementation System.

SPACE OPERATIONS -
National Aeronautics and Space Administration (NASA) or military launch and landing operations - including unmanned weather rocket launches, unmanned missile launches, Space Shuttle launches and landings, and Space Shuttle training operations - require coordination between the Department of Defense (DoD), NASA, and the FAA. Several FAA centers in the affected areas are impacted by these activities.

In the event of a Space Shuttle emergency, any civil or DoD installation with a 10,000-foot or longer runway could potentially be called upon to support an emergency landing. In the event of an emergency landing within the United States, the Johnson Space Center Mission Control will relay all required airspace requests to the FAA ATCSCC for coordination with appropriate ARTCC and Center Radar Approach Control (CERAP) facilities. ARTCC/CERAP facilities will coordinate with affected terminal or AFSS/FSS facilities. For an emergency landing outside the continental United States, but in airspace under United States jurisdiction, oceanic air traffic control facilities coordinate with other air traffic control facilities or governments as appropriate or feasible. If unable to broadcast a prior notification message, the Space Shuttle Orbiter crew attempts to contact the intended airfield on the 243.0-megahertz emergency channel approximately 12 minutes prior to touchdown.

Upon receiving notification of an emergency landing, air traffic control responsibilities are to clear affected airspace as quickly as possible, alert the available fire/crash/rescue equipment to respond using standard fire fighting protective equipment and self-contained breathing apparatuses, and ensure appropriate authorities are notified to prevent access by unauthorized personnel within 400 meters of the Space Shuttle Orbiter due to toxic fuels onboard.

Benefits: Current operations are provided in the NAS.

Time Frame: As Implemented

Earliest IOC - Latest IOC: -

Solution Set(s): None

Service: Emergency and Alerting

Capability: Emergency Assistance

Lead Organization: Not Assigned - Not Assigned

Update Date: 21-Jan-2010 by David Bartlett

ID / Revision: 26 / 2

---

Identifier: 106201

Name: Current Emergency Alerting Support

Description: The National Search and Rescue (SAR) Plan assigns search and rescue responsibilities to military agencies for conducting physical search and rescue operations. Under the plan, the U.S. Coast Guard (USCG) is responsible for coordinating SAR in the Maritime Region, and the United States Air Force (USAF) is responsible in the Inland Region. To carry out these responsibilities, the USCG and the USAF have established the Rescue Coordination Center (RCC) to direct SAR activities within their regions. The FAA provides emergency services to aircraft in distress, and assures that SAR procedures are initiated if an aircraft becomes overdue or unreported. This is accomplished through the Air Route Traffic Control Centers (ARTCC) for Instrument Flight Rules (IFR) aircraft, and through the Automated Flight Service Stations (AFSS) for Visual Flight Rules (VFR) aircraft. The FAA also is responsible for attempting to locate overdue or unreported aircraft by Information Request (INREQ) and Alert Notice (ALNOT) communications searches, and cooperating in the physical search by making all possible facilities available for use of the searching agencies. When an aircraft is overdue or missing, a communications search is initiated to determine if or when the aircraft last contacted an air traffic control facility. The aircraft's essential information is gathered including flight plan data, last known position, last recorded heading, search area conditions - which includes current and forecasted weather - and distributed to the RCC for the rescue coordinator prior to him initiating the SAR effort. If air traffic control facilities hear or receive a report of an Emergency Locater Transmitter (ELT) signal, they attempt to determine the location of the signal. Direction finding facilities obtain fixed bearings, and any other pertinent information from the ELT signal. This information is also forwarded to the RCC to support the SAR activities. Different facilities are responsible for alert support. These responsibilities are noted below.

Air Traffic Control Towers (ATCT), Terminal Radar Approach Controls (TRACON), and ARTCCs consider an IFR aircraft overdue when neither communications nor radar contact, this information derived from the radar controllers Display System Replacement (DSR), can be established and 30 minutes have passed since its Estimated Time of Arrival (ETA) over a specified or compulsory reporting point or at a clearance limit in their area, or its clearance void time.

If they have reason to believe that an aircraft is overdue prior to 30 minutes, they take the appropriate action immediately, which would include notifying the RCC and starting SAR activities. The ARTCC in whose area the aircraft is first unreported or overdue makes the determination that an aircraft is overdue or missing and takes the action to advise the RCC.

ATCTs and TRACONs alert the ARTCC when an aircraft is considered to be in emergency status and may require SAR procedures, or when an IFR aircraft is overdue. The facility forwards pertinent information such as flight plan information, time of last transmission received, last position report, number of persons on board, fuel status, facility working the aircraft and frequency, action taken by reporting facility and proposed action, last known position, estimated present position, and maximum range of flight of the aircraft based on remaining fuel and airspeed. Additional information, such as current area weather, would include the position of other aircraft near the aircraft's route of flight whether or not an ELT signal has been heard or reported in the vicinity of the last known position and other pertinent information that may help locate the aircraft. The ARTCC would then alert the RCC and forward all the available information.

The ARTCC also issues an ALNOT to all facilities generally 50 miles on either side of the route of flight, from the last reported position to destination, including the original or amended flight plan, as appropriate, and the last known position of the aircraft. At the recommendation of the RCC, or as deemed appropriate, the ALNOT may be issued to cover the maximum range of the aircraft. An ALNOT must be issued before the RCC can begin SAR procedures. When an air traffic control facility receives an INREQ or ALNOT, it checks the position records to determine whether the aircraft has contacted the facility. It notifies the originator of the results or status of this check within one hour of the time the alert was received. It retains the alert in an active status, and immediately notifies the originator of subsequent contact, until a cancellation is received. The ARTCC plots the flight path of the aircraft on a chart, including position reports, predicted positions, possible range of flight, and any other pertinent information, derived from DSR and en route Host Computer System. They solicit the assistance of other aircraft known to be operating near the aircraft in distress or its last known position, and forward this information to the RCC as appropriate.

The ARTCC would transfer responsibility for further search to the RCC when (1) 30 minutes have elapsed after the estimated aircraft fuel exhaustion time, (2) the aircraft has not been located within one hour after ALNOT issuance, or (3) when the ALNOT search has been completed with negative results. The ARTCC cancels the ALNOT when the aircraft is located or the search is abandoned.

The ARTCC also serves as the contact point for collecting information and coordinating with the RCC, on all ELT signals. ELT signals are required for most general aviation airplanes. Various ELT signals were developed as a means of locating downed aircraft. These electronic, battery operated transmitters operate on one of three frequencies including 121.5 MHz, 243.0 MHz, and the newer 406 MHz. ELT signals operating on 121.5 MHz and 243.0 MHz are analog devices. The newer 406 MHz ELT is a digital transmitter that can be encoded with the owner's contact information or aircraft data.

In the case of VFR aircraft, the Flight Service Station (FSS) plays an important role in the alerting support capability function. The En Route Flight Advisory Service (EFAS) is specifically designed to provide en route aircraft with timely and meaningful weather advisories pertinent to the type of flight intended, route of flight, and altitude. The EFAS position receives and forwards reports of ELT signals and seeks to verify those ELT signals by requesting other aircraft to monitor the emergency frequency and report.

The FSS specialist considers an aircraft on a VFR flight plan overdue when it fails to arrive 30 minutes after its ETA, and communications or location cannot be established. An aircraft not on a flight plan is considered as overdue at the actual time a reliable source reports it to be at least one hour late at destination. Based on this overdue time, they apply the same procedures and action times as for aircraft on a flight plan. When such a report is received, they verify that the aircraft actually departed and that the request is for a missing aircraft rather than a person. Missing person reports are referred to the appropriate authorities.

The departure AFSS/FSS station is responsible for SAR action until receipt of the destination station's acknowledgment for the flight notification message. This responsibility is then transferred to the destination station.

| | |
|---|---|
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | Emergency and Alerting |
| Capability: | Alerting Support |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 28 / 2 |

Identifier: 106202

Name: Enhance Emergency Alerting

Description: Controllers and search and rescue support, using Automatic Dependent Surveillance Broadcast (ADS-B) provide location information and discrete aircraft identification, are able to quickly locate distressed or downed aircraft without resorting to 1200 beacon tracks and support from Civil Air Patrol search flights. Controllers improve their ability to assist in locating a downed aircraft and to identify and track visual flight rules flights.

The National Search and Rescue (SAR) Plan assigns search and rescue responsibilities to military agencies for conducting physical search and rescue operations. Under the plan, the U.S. Coast Guard is responsible for the coordination of SAR in the Maritime Region, and the USAF is responsible in the Inland Region. To carry out these responsibilities, the Coast Guard and the Air Force have established Rescue Coordination Centers (RCCs) to direct SAR activities within their regions.

The FAA provides emergency service to aircraft in distress, and assures that SAR procedures are initiated if an aircraft becomes overdue, unreported, or upon detection of an emergency locator signal. Precise information is available from Global Positioning System (GPS) and Automatic Dependent Surveillance - Broadcast (ADS-B) equipped aircraft, both of which automatically provide position via digital data links. This is accomplished through the Air Route traffic Control Centers (ARTCCs) for IFR aircraft, and through the Automated Flight Service Stations (AFSSs) for VFR aircraft. The FAA also is responsible for attempting to locate overdue or unreported aircraft by INREQ (Information Request) and ALNOT (Alert Notice) communications searches, and cooperating in the physical search by making all possible facilities available for use of the searching agencies.

When an aircraft is overdue or missing, a communications search is initiated to determine if or when the aircraft last contacted an ATC facility. The essential information is gathered for the aircraft (flight plan data, last known position, last recorded heading, search area conditions which includes current and forecasted weather etc.) and distributed to the Rescue Coordination Center (RCC) for the rescue coordinator prior to initiating the SAR effort. If ATC facilities hear or receive an ELT (Emergency Locater Transmitter) signal, the distressed aircraft location can be accurately determined by the GPS position data. This information is forwarded to the RCC to support the SAR activities.

The Air Route Traffic Control Center (ARTCC) also considers an aircraft to be in emergency status and requiring Search and Rescue (SAR) procedures when it is receiving an emergency locator signal from a distressed aircraft. The facility forwards pertinent information such as the GPS position of the aircraft, flight plan information, time of last transmission received (by whom and frequency), last position report, number of persons on board, fuel status, facility working the aircraft and frequency, action taken by reporting facility and proposed action, last known position, estimated present position, and maximum range of flight of the aircraft based on remaining fuel and airspeed, and additional information such as, current area weather, the position of other aircraft near the aircraft's route of flight, whether or not an ELT signal has been heard or reported in the vicinity of the last known position and other pertinent information that may help locate the aircraft. The ARTCC would then alert the RCC and forward all the available information.

The ARTCC also issues an alert notice (ALNOT) to all facilities generally 50 miles on either side of the route of flight, from the last reported position to destination, including the original or amended flight plan, as appropriate, and the last known position of the aircraft. At the recommendation of the RCC or as deemed appropriate, the ALNOT may be issued to cover the maximum range of the aircraft. NOTE- An ALNOT must be issued before the RCC can begin search and rescue procedures.

When an ATC facility receives an Information Request (INREQ) or ALNOT, it checks the position records to determine whether the aircraft has contacted the facility. It notifies the originator of the results or status of this check within one hour of the time the alert was received. It retains the alert in an active status, and immediately notifies the originator of subsequent contact, until a cancellation is received. The ARTCC plots the flight path of the aircraft on a chart, including position reports, predicted positions, possible range of flight, and any other pertinent information, derived from DSR and en-route Host Computer System (HCS). They solicit the assistance of other aircraft known to be operating near the aircraft in distress or it's last known position, and forward this information to the RCC as appropriate.

The ARTCC would transfer responsibility for further search to the RCC when thirty minutes have elapsed after the estimated aircraft fuel exhaustion time, the aircraft has not been located within one hour after ALNOT issuance, or when the ALNOT search has been completed with negative results. The ARTCC cancels the ALNOT when the aircraft is located or the search is abandoned.

Benefits: With the use of GPS, a Controller's ability to assist in locating a downed airplane is improved.

Time Frame: Mid Term

Earliest IOC - Latest IOC: 2010 - 2016

Solution Set(s): Increase Safety, Security, and Environmental Performance

| | |
|---|---|
| Service: | Emergency and Alerting |
| Capability: | Alerting Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 27 / 10 |

---

| | |
|---|---|
| Identifier: | 107101 |
| Name: | Current Enroute Navigation |
| Description: | NAS provided ground- and space-based navigation services support point-to-point navigation on published Jet Routes and Victor Airways using the services and facilities of VHF Omnidirectional Range (VOR), VOR and Distance Measuring Equipment (DME), TACAN, or Non-Directional Beacon (NDB) supported using Automatic Direction Finding (ADF) avionics. Area navigation (RNAV) is achievable using VOR/DME facilities and approved avionics as primary means and/or Global Positioning System (GPS), GPS and Wide Area Augmentation System (GPS/WAAS) avionics, or Loran-C avionics approved as supplemental means. Inertial Navigation Systems (INS) provide a sufficient margin of performance for domestic RNAV operations provided that GPS, Loran-C, VOR, DME, or TACAN updates to position are provided to the INS at least once per hour. Flight Management Systems (FMS) provide additional functionality by combining navigation position from multiple sensors and enabling other reporting functions of automatic reporting of aircraft present position latitude, longitude, and geometric altitude for station keeping and collision avoidance. |
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | Navigation |
| Capability: | Airborne Guidance |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 39 / 2 |

---

| | |
|---|---|
| Identifier: | 107104 |
| Name: | Current Precision Approach, Landing and Departure |
| Description: | Ground-based instrument landing systems support precision approach and landing for Category I, II and III visibility to decision altitude minimums. These instrument landing systems radiate precision lateral and vertical descent guidance signals that are received and processed by aircraft avionics and pilots to guide the aircraft to the runway. Precision instrument landing systems can be augmented with Marker Beacon facilities, which, when signals are received by the Marker Beacon avionics indicate the aircrafts approximate position along the approach path, and NDB signals when received by ADF Avionics provide azimuth guidance. DME avionics provide precise measure of distance to the runway threshold for landing or missed approach, or for departure distance from a DME facilitated airport. All instrument approaches require approved runway lighting facilities. |
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | Navigation |
| Capability: | Airborne Guidance |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 36 / 2 |

---

| | |
|---|---|
| Identifier: | 107107 |
| Name: | Ground Based Augmentation System (GBAS) Precision Approaches |
| Description: | Global Positioning System (GPS)/GBAS support precision approaches to Category I and eventually Category II/III minimums, for properly equipped runways and aircraft. GBAS can support approach minimums at airports with fewer restrictions to surface movement, and offers the potential for curved precision approaches. GBAS may also support high-integrity surface movement requirements.<br><br>GBAS would provide Category I and Category II/III precision approach and landing services and position information for surface operations. GBAS Category I systems may be installed at airports requiring a stand-alone augmented GPS navigation and landing capability, or at airports where Satellite-Based Augmentation System (SBAS) coverage is unable to meet existing navigation and landing requirements due to insufficient satellite coverage or availability (e.g., some locations in Alaska). GBAS Category II/III systems may be installed at higher usage airports that require more capable navigation and landing services.<br><br>A single GBAS system provides precision-approach capabilities to multiple runways or landing areas. GBAS provides precision-approach service that is robust to atmospheric phenomena that might cause loss of SBAS vertical guidance. |

| | |
|---|---|
| Benefits: | *Improved efficiency<br>*Increased availability of precision approaches<br>*Increased safety<br>*Reduced fuel-burn and engine emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2013 - 2018 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | Navigation |
| Capability: | Airborne Guidance |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 23-Mar-2010 by David Bartlett |
| ID / Revision: | 34 / 8 |

---

| | |
|---|---|
| Identifier: | 107111 |
| Name: | Current Non-precision Approach and Departure |
| Description: | NAS provided ground- and space-based navigation services support non-precision instrument navigation for lateral approach and departure guidance using the services and facilities of VOR, VOR and DME, Localizer (LOC), or NDB supported using ADF avionics. Non-precision instrument approaches are also available using area navigation (RNAV) relying upon VOR/DME facilities and approved avionics. GPS, GPS with Baro or GPS/WAAS avionics may also be used to provide LNAV, VNAV, or LPV (WAAS) approaches where authorized. Flight Management Systems (FMS) provide additional functionality by combining navigation position from multiple sensors and enabling guidance for a runway in accordance with published instrument approach and departure procedures. |
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | Navigation |
| Capability: | Airborne Guidance |

| | |
|---|---|
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 35 / 2 |

---

| | |
|---|---|
| Identifier: | 107115 |
| Name: | Low Visibility/Ceiling Takeoff Operations |
| Description: | Leverages some combination of HUD, EFVS, SVS, or advanced vision system capabilities to allow appropriately equipped aircraft to takeoff in low visibility conditions. Due to onboard avionics the aircraft will be less dependent on ground based infrastructure at the airport while conducting take-off operations.<br><br>Currently, visibility minimums for takeoff are dependent on aircraft equipment, ground infrastructure, and runway marking and lighting. This ensures that pilots are able to visually maintain the runway centerline during both nominal and aborted takeoffs. By using cockpit-based technologies such as HUD, EFVS, SVS or other advanced vision system technologies, the pilot will be able to maintain an equivalent awareness of runway centerline with reduced dependence on airport infrastructure when visual conditions are below those normally required for takeoff. |
| Benefits: | *Increased Access |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2015 - 2018 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | Navigation |
| Capability: | Airborne Guidance |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Apr-2010 by David Bartlett |
| ID / Revision: | 37 / 5 |

---

| | |
|---|---|
| Identifier: | 107116 |
| Name: | Low Visibility/Ceiling Departure Operations |

Description: Leverages augmented GNSS capabilities to allow appropriately equipped aircraft to depart in low visibility conditions. Due to onboard avionics the aircraft will be able to depart in low visibility conditions using RNAV/RNP SIDs, EFVS, SVS, or advanced vision systems.

In order to depart an airfield and enter the enroute structure the aircraft must be able to achieve a minimal prescribed climb performance in order avoid any natural or man made hazard. If an aircraft can not meet the required climb performance the aircraft will be able to either use precision navigation or visual "see and avoid" procedures that enable the aircraft to avoid the hazard while flying at a lower required rate of climb.

Precision navigation will allow for the pilot to safely depart the airfield at a lower climb rate while still maintaining a safe buffer from the hazard.

When the pilot elects to use a "see and avoid" option for the departure, the pilot would normally be required to meet a minimal visibility and/or ceiling requirement to go along with a lower than normal climb performance. By using EFVS, SVS, or an advanced vision system, the pilot would be able to elect the "see and avoid" procedure by achieving an equivalent level of safety to the natural vision requirements.

Benefits: *Increased access
*Enhanced Safety

Time Frame: Mid Term

Earliest IOC - Latest IOC: 2015 - 2018

Solution Set(s): Increase Flexibility in the Terminal Environment

Service: Navigation

Capability: Airborne Guidance

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 27-Jan-2010 by Charles Horne

ID / Revision: 40 / 5

---

Identifier: 107117

Name: Low Visibility/Ceiling Approach Operations

Description: The ability to complete approaches in low visibility/ceiling conditions is improved for aircraft equipped with some combination of navigation derived from augmented GNSS or ILS and other cockpit-based technologies or combinations of cockpit-based technologies and ground infrastructure.

The ability to complete approaches in low visibility/ceiling conditions is improved for aircraft equipped with some combination of navigation derived from augmented GNSS or ILS and Head-up Display (HUD), EFVS, SVS, advanced vision system and other cockpit-based technologies that combine to improve human performance. Cockpit-based technologies allow instrument approach procedure access with reduced requirements on ground-based navigation and airport infrastructure. Due to onboard avionics airport access is maintained in low visibility/ceiling conditions.

Benefits: To Be Determined

Time Frame: Mid Term

| | |
|---|---|
| Earliest IOC - Latest IOC: | 2010 - 2015 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | Navigation |
| Capability: | Airborne Guidance |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 27-Jan-2010 by Charles Horne |
| ID / Revision: | 31 / 7 |

---

| | |
|---|---|
| Identifier: | 107118 |
| Name: | Low Visibility/Ceiling Landing Operations |
| Description: | The ability to land in low visibility/ceiling conditions is improved for aircraft equipped with some combination of navigation derived from augmented GNSS or ILS and other cockpit-based technologies or combinations of cockpit-based technologies and ground infrastructure.<br><br>The ability to land in low visibility/ceiling conditions is improved for aircraft equipped with some combination of navigation derived from augmented GNSS or ILS, and Head-up Display (HUD), EFVS, SVS, advanced vision system and other cockpit-based technologies that combine to improve human performance. Cockpit-based technologies allow instrument approach procedure access with reduced requirements on ground-based navigation and airport infrastructure. Due to onboard avionics airport access is maintained in low visibility/ceiling conditions. |
| Benefits: | *Increased Safety<br>*Increased Access |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2015 - 2018 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | Navigation |
| Capability: | Airborne Guidance |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 27-Jan-2010 by Charles Horne |
| ID / Revision: | 30 / 7 |

| | |
|---|---|
| Identifier: | 107119 |
| Name: | Expanded Low Visibility Operations using Lower RVR Minima |
| Description: | Lowering runway visual range (RVR) minima from 2400 ft to 1800 ft. (or lower depending on the airport and requirement) at selected airports using RVR systems, aircraft capabilities and procedural changes provides greater access to OEP, satellite and feeder airports during low visibility conditions. Utilization of these improvements will increase NAS capacity and traffic flow during periods of Instrument Meteorological Conditions (IMC) and allowing a greater number of aircraft completing scheduled flights under marginal weather conditions. Without these improvements, flight are either diverted or delayed, both with rippling impact throughout the NAS and a high cost associated with them.<br><br>This improvement allows increased runway capacity during periods of low visibility by providing increased arrivals/departures at high density airports. It also allows the airlines to maintain planned scheduled flights in marginal weather conditions to decrease flight delays, cancellations, and/or very costly diversions. Capacity in NAS is also increased through use of a greater number airports, extending the base capacity beyond the OEP core. Flight Standards is instituting reduced takeoff and landing minima across the NAS based on RVR and in certain cases, installation of additional RVR are required.<br><br>This Next Generation Air Transportation System (NextGen) program realizes near-term benefits that enable other mid-term and far-term Operational Improvements. It also addresses improvements to low visibility operations throughout the NAS. This improvement achieves Area Navigation (RNAV) benefits as stipulated in the NextGen Implementation Plan and the Roadmap for Performance-Based Navigation. |
| Benefits: | *Increase capacity<br>*Increase flexibility<br>*Schedule delay improvements throughout the NAS in periods of marginal weather<br>*Extension of VMC through lower minima and better performance in IMC<br>*Major Cost savings to the FAA and stakeholders |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2009 - 2011 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | Navigation |
| Capability: | Airborne Guidance |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 29 / 6 |

| | |
|---|---|
| Identifier: | 107201 |
| Name: | Current Airport Surface Guidance |

| | |
|---|---|
| Description: | Aircraft movement on airports is guided by runway and taxiway lighting, markage, and signage. |
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | Navigation |
| Capability: | Surface Guidance |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 24 / 2 |

---

| | |
|---|---|
| Identifier: | 107202 |
| Name: | Low Visibility Surface Operations |
| Description: | Aircraft and ground vehicle movement on airports in low visibility conditions is guided by accurate location information and moving map displays.<br><br>Aircraft and ground vehicles determine their position on an airport from GPS, WAAS, LAAS, via ADS-B and Ground-Based Transceivers (GBT) systems with or without surface based surveillance. Location information of aircraft and vehicles on the airport surface is displayed on moving maps using Cockpit Display of Traffic Information (CDTI) or aided by Enhanced Flight Vision Systems (EFVS), Enhanced Vision Systems (EVS), Synthetic Visions Systems (SVS) or other types of advanced vision or virtual vision technology. |
| Benefits: | *Increased Safety<br>*Increased Access<br>*Increased situation awareness and plan ahead capability |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2015 - 2018 |
| Solution Set(s): | Increase Flexibility in the Terminal Environment |
| Service: | Navigation |

Capability: Surface Guidance

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 27-Jan-2010 by Charles Horne

ID / Revision: 25 / 6

---

Identifier: 108101

Name: Current Airspace Design

Description: Current airspace designs have evolved over time and provide the basis:

·Designating airspace volumes Class A-G based on the level of service and aircraft capability requirements.

·Assignment of volumes airspace to service providers for the provision of separation and traffic advisories, e.g. sectors.

·The evaluation and designation of hazards such as terrain, obstacles, phenomena.

·The establishment of waypoints and route structures to provide for flow across the nation including the interplay with navigation to provide signal in space.

·Guidelines for designating, on a dynamic basis, airspace for military operations, security, special events, etc.

·Guidelines for assuring required communications, navigation and surveillance coverage in the design

Benefits: Current operations are provided in the NAS.

Time Frame: As Implemented

Earliest IOC - Latest IOC: -

Solution Set(s): None

Service: Airspace Management

Capability: Airspace Design

Lead Organization: Not Assigned - Not Assigned

Update Date: 21-Jan-2010 by David Bartlett

ID / Revision: 79 / 2

| | |
|---|---|
| Identifier: | 108105 |
| Name: | Flow Corridors - Level 1 Static |
| Description: | High density En Route static flow corridors accommodate aircraft that are capable of self-separation, equipped with Automatic Dependent Surveillance-Broadcast (ADS- B) and onboard conflict detection and alerting, traveling on similar routes, achieving high traffic throughput by minimizing complexity and crossing traffic.<br><br>When there are large numbers of suitably equipped aircraft traveling in the same direction on similar routes, the Air Navigation Service Provider (ANSP) may implement flow corridors, which consist of long tubes or "bundles" of parallel lanes. Aircraft within the corridors are responsible for separation from other aircraft (that is, the corridors are self-separation airspace), and use onboard separation capabilities for entering and exiting the corridors, as well as for overtaking, all of which are accomplished with well-defined procedures to ensure safety. Flow corridors efficiently handle very high traffic densities, increasing throughput and increasing the airspace available to other traffic. Flow corridors are procedurally separated from other traffic not in the corridor. Procedures exist to allow aircraft to safely exit the corridor in the event of a declared emergency. |
| Benefits: | Increased efficiency |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2020 - 2024 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | Airspace Management |
| Capability: | Airspace Design |
| Lead Organization: | Joint Planning and Development Office - AJP-C |
| Update Date: | 16-Feb-2010 by David Bartlett |
| ID / Revision: | 78 / 8 |

| | |
|---|---|
| Identifier: | 108106 |
| Name: | Flow Corridors - Level 2 Dynamic |
| Description: | High density En Route dynamic flow corridors accommodate aircraft that are capable of self-separation , equipped with Automatic Dependent Surveillance-Broadcast (ADS- B) and onboard conflict detection and alerting, traveling on similar wind-efficient routes or through airspace restricted by convective weather cells, Special Use Airspace (SUA), or overall congestion.<br><br>Dynamic high density flow corridors are defined daily and shifted throughout the flight day to avoid severe weather regions and airspace restrictions (e.g., SUA) or take advantage of favorable winds. Dynamic corridor entry and exit points are also defined. This extends static flow corridor technology via dynamic airspace design capabilities to provide more En Route capacity to trajectory-based aircraft when the available airspace is restricted. Real-time information on corridor location, and logistics and procedures for dynamically relocating a corridor while it is in effect must be developed. If corridor use is to be widespread, techniques for merging, diverging, and crossing corridors may also be required. |

| | |
|---|---|
| Benefits: | Increased efficiency |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2025 - 2030 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | Airspace Management |
| Capability: | Airspace Design |
| Lead Organization: | Joint Planning and Development Office - AJP-C |
| Update Date: | 16-Feb-2010 by David Bartlett |
| ID / Revision: | 77 / 8 |

---

| | |
|---|---|
| Identifier: | 108201 |
| Name: | Current Airspace Management |
| Description: | Current airspace management assigns airspace classification to volumes of airspace. Within those airspaces the service provides sectorizations and routings based on the characteristics of the aircraft operating within those airspace volumes. Airspace Management also reviews construction projects for their impact on airspace, and designates and schedules airspace for special use activities. Designs are limited by the minimum capabilities of aircraft allowed within a class of airspace and by the limitation of automation and the management/coverage of Communications, Navigation, and Surveillance (CNS) assets. |
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | Airspace Management |
| Capability: | Airspace Management |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |

| | |
|---|---|
| ID / Revision: | 116 / 2 |

---

| | |
|---|---|
| Identifier: | 108206 |
| Name: | Flexible Airspace Management |
| Description: | ANSP automation supports reallocation of trajectory information, surveillance, communications, and display information to different positions or different facilities.<br>The ANSP moves controller capacity to meet demand. Automation enhancements enable increased flexibility to change sector boundaries and airspace volume definitions in accordance with pre-defined configurations. The extent of flexibility has been limited due to limitations of automation, surveillance, and communication capabilities, such as primary and secondary radar coverage, availability of radio frequencies, and ground-communication lines. New automated tools will define and support the assessment of alternate configurations as well as re-mapping of information (e.g., flight and radar) to the appropriate positions. |
| Benefits: | ·Improved efficiency<br>·Maintained throughput<br>·Increased flexibility<br>·Facilitating reallocation of resources |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2015 - 2018 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | Airspace Management |
| Capability: | Airspace Management |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 02-Feb-2010 by Frank Hermann |
| ID / Revision: | 118 / 9 |

---

| | |
|---|---|
| Identifier: | 108209 |
| Name: | Increase Capacity and Efficiency Using Area Navigation (RNAV) and Required Navigation Performance (RNP) |

| | |
|---|---|
| Description: | Both RNAV and RNP will enable more efficient aircraft trajectories. RNAV and RNP combined with airspace changes, increase airspace efficiency and capacity.<br>RNAV and RNP will permit the flexibility of point-to-point operations and allow for the development of routes, procedures, and approaches that are more efficient and free from the constraints and inefficiencies of the ground-based NAVAIDS. This capability can also be combined with an Instrument Landing System (ILS), to improve the transition onto an ILS final approach and to provide a guided missed approach. Consequently, RNAV and RNP will enable safe and efficient procedures and airspace that address the complexities of the terminal operation through repeatable and predictable navigation. These will include the ability to implement curved path procedures that can address terrain, and noise-sensitive and/or special-use airspace. Terminal and en route procedures will be designed for more efficient spacing and will address complex operations. |
| Benefits: | ·Improved efficiency<br>·Increased access and capacity<br>·Reduced fuel burn and engine emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2010 - 2014 |
| Solution Set(s): | Initiate Trajectory Based Operations |
| Service: | Airspace Management |
| Capability: | Airspace Management |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 23-Mar-2010 by David Bartlett |
| ID / Revision: | 115 / 11 |

---

| | |
|---|---|
| Identifier: | 108212 |
| Name: | Improved Management of Special Activity Airspace |
| Description: | Special Activity Airspace (SAA) assignments, schedules, coordination, and status changes are conducted automation-to-automation.  Changes to status of SAA are readily available for operators and Air Navigation Service Providers (ANSP).  Status changes are transmitted to the flight deck via voice or data communications.  Flight trajectory planning is managed dynamically based on real-time use of airspace.<br><br>Airspace use is optimized and managed in real-time, based on actual flight profiles and real-time operational use parameters.  Airspace reservations for military operations, unmanned aircraft system flights, space flight and re-entry, restricted or warning areas, and flight training areas are managed on an as-needed basis.  Enhanced automation-to-automation communications and collaboration enables decision-makers to dynamically manage airspace for special use, increasing real-time access and use of unused airspace.<br><br>This will enable ANSP decision-support tools, integrated with automation-to-automation flight planning, to have increased access and improved coordination of airspace use.<br><br>Flight deck automation is enhanced to include data communications capabilities and to recognize SUA-encoded data.  The SUA status is available via uplink to the cockpit in graphical (e.g., additional airspace information over FIS-B) and automation-readable form, supporting pre-flight and in-flight planning. |

Benefits: *Improved efficiency
*Increased access
*Reduced fuel-burn and engine emissions

Time Frame: Mid Term

Earliest IOC - Latest IOC: 2012 - 2014

Solution Set(s): Improve Collaborative ATM

Service: Airspace Management

Capability: Airspace Management

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 23-Mar-2010 by David Bartlett

ID / Revision: 112 / 13

---

Identifier: 108213

Name: Dynamic Airspace Performance Designation

Description: Airspace allocation is flexible allowing dynamic access requirements to airspace based on the type of operations to be flown within a given airspace. Flying within certain airspace is based on aircraft performance requirements, to accommodate increasing demand or minimize impacts of adverse weather or other system constraints.

A dynamic change in airspace access is executed by providing real-time airspace performance designation information and requirements to airspace users, whether preflight or during airborne operations. Temporary Flight Restrictions and Special Use Airspace use is factored into the dynamic airspace performance designation process. A change to airspace performance designation may be routine or made dynamically in response to forecast demand. This requires development of rules and operational procedures, including established look-ahead times, for defining airspace performance designation and the type of operations permitted within a given airspace, as well as those allowed in preconfigured airspace designations. Flight planning and airborne aircraft may be affected by airspace designation. This OI does not preclude the use of predefined airspace structures or airspace performance designation such as those that may be used/required on a frequent basis, such as identified choke-points or areas of known high density, requiring designated performance capabilities.

Benefits: Increased efficiency

Time Frame: Far Term

Earliest IOC - Latest IOC: 2019 - 2023

Solution Set(s): Initiate Trajectory Based Operations

Service: Airspace Management

Capability: Airspace Management

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 26-Apr-2010 by David Bartlett

ID / Revision: 113 / 7

---

Identifier: 109101

Name: Current Monitoring And Maintenance

Description: The National Airspace System (NAS) includes thousands of pieces of equipment that must be monitored and maintained at over 5,000 sites. The Remote Maintenance Monitoring System (RMMS) monitors system performance to detect alarm or alert conditions and transmits status messages to the Maintenance Processor System, a data processing system designed to monitor and control remote facilities. The RMMS initiates diagnostics tests and adjusts system parameters or configurations when properly commanded. RMMS is primarily a monitoring system, although it has some control capabilities allowing limited remote maintenance of some systems. RMMS is transitioning to the NAS Infrastructure Management System (NIMS), a primary component of the concept of NAS Infrastructure Management (NIM).

NIMS will provide three primary capability improvements over RMMS: improved monitoring (especially in providing the big picture view versus individual system information), the potential for improved remote maintenance (this functionality often must also be built into the system to be maintained), and improved information security. NIMS is being implemented using a phased approach. NIMS Phase 1, which has been completed, provided modern Commercial Off-the-Shelf (COTS) tools to implement service-based systems management. A COTS workforce management tool was installed in the NIMS Premier Facility in the Air Traffic Control System Command Center (ATCSCC) in Herndon, Virginia. The Enterprise Management (EM) System provides remote monitoring and control functionality to 3,700 NAS facilities and deployed 5,800 maintenance data terminals (MDT).

NIMS Phase 2 will provide automated support to several core operational functions. NIMS Phase 3 will build upon previous phases and include intelligent fault correlation, information sharing, and additional functionality tied to NAS technological improvements.

The FAA's national and international message and packet switching assets are monitored by two National Network Control Centers (NNCCs), one located in Atlanta, GA and the other in Salt Lake City, UT. Each NNCC domain covers approximately one-half of the country, however each can take over the entire country if major interruptions occur at the other NNCC. The FAA's non-packet switching assets are monitored as follows.

NAS infrastructure operations in the NIMS environment is a three-tiered hierarchy, consisting of a National Operations Control Center (NOCC) at the top tier, three Operations Control Centers (OCCs) at the second tier, and 30 Service Operations Centers (SOCs) and approximately 300 Work Centers (WCs) at the third tier. The NOCC is located at the ATCSCC in Herndon, Virginia. Under the NAS infrastructure operations in the NIM environment, the NOCC will be the top tier in a three-tier hierarchy. The NOCC coordinates operations from a national perspective and standardizes field operations across the NAS to help facilitate consistent interaction with customers.

OCCs are second tier in the NIM hierarchy. They function in a domain approximately one-third of the country in scope (including Alaska and offshore service areas). They provide coverage for all services, and have significant monitoring and control functions, with the exception of telecommunications. They coordinate with the NOCC. The three OCC locations are the Pacific OCC in San Diego, CA, the Mid-States OCC in Kansas City, KS, and the Atlantic OCC in Atlanta, GA.

SOCs and WCs are third tier in the NIM hierarchy. The SOC scope is limited to support of selected high NAS impact Air Traffic facilities such as Air Route Traffic Control Centers and selected high density Terminal Radar Approach Controls (TRACONs). SOCs cover all services, and have complete monitoring and control functions. The WCs' scope is limited to a specific geographic area.
Some WCs service large geographic areas while others service only single high NAS impact facilities. They cover all services, and have local control functions. They coordinate with the assigned OCC or SOC.

| | |
|---|---|
| | Infrastructure management support for space transportation users is generally provided by the Department of Defense (DoD), the National Aeronautics and Space Administration (NASA), and commercial space transportation service providers. The FAA supports Kennedy Space Center (KSC) Space Shuttle launch and recovery missions by monitoring and maintaining KSC tactical air navigation (TACAN) facilities on a fee-for-service basis. Prior to a launch or recovery mission, FAA technicians perform a facility certification check and report any operational limitations that cannot be corrected on-site prior to the scheduled missions. FAA maintains the TACAN facilities in accordance with FAA/NASA agreements. |
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | Infrastructure-Information Management Service |
| Capability: | Monitoring and Maintenance |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 73 / 2 |

---

| | |
|---|---|
| Identifier: | 109201 |
| Name: | Current Spectrum Management |
| Description: | The FAA Office of Spectrum Policy and Management is responsible for ensuring that the radio frequency spectrum needs of both military and civil aviation are met. The aviation community is one of the major users of the radio frequency spectrum in the United States. The top three spectrum users in the Federal Government are the FAA, the Air Force, and the Navy. The FAA presently has over 50,000 frequency assignments. Virtually all of the FAA's navigation, communication, and surveillance systems are dependent on use of the radio frequency spectrum. Numerous aircraft systems, such as airborne weather radar, are also users of the spectrum. Spectrum engineers are involved from 'cradle-to-grave' in nearly all aviation systems. Radio frequency spectrums must be available before developing or procuring new communications electronics systems. Other responsibilities include assisting in determining the proper frequency band for proposed equipment and applicable standards; testing to ensure that equipment meets specifications for electromagnetic compatibility and radiation hazards criteria; and performing detailed on-site investigations needed to resolve cases of radio frequency interference.<br><br>The FAA's Office of Spectrum Policy and Management is also active in a number of world standards organizations addressing a wide variety of international spectrum issues. The various organizations develop policy, technical procedures, and criteria concerning the use, sharing, management, and allocation of the radio frequency spectrum. Establishment of frequency coordination procedures with other member nations is another important aspect of the international spectrum management process. |
| Benefits: | Current operations are provided in the NAS. |
| Time Frame: | As Implemented |

| | |
|---|---|
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | Infrastructure-Information Management Service |
| Capability: | Spectrum Management |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 94 / 2 |

---

| | |
|---|---|
| Identifier: | 109301 |
| Name: | Current Government/Agency Support |

Description:

Government/agency support provides information and coordination services. The National Airspace System (NAS) supports Department of Defense (DoD) operations, law enforcement missions, government land management agencies, forest fire-fighting operations, and state aviation managers. Air Traffic Control (ATC) supports natural disaster relief flights, medical emergency flights, aerial forest fire-fighting and drug interdiction flights, while managing routine demand on the system, weather constraints, etc.

In support of other government agencies during search and rescue and accident investigations, the NAS will provide any and all information relating to incidents and accidents to the National Transportation Safety Board (NTSB).

ATC facilities coordinate with DoD air defense organizations to detect and identify unauthorized aircraft entering Air Defense Identification Zones or Defense Early Warning Identification Zones.

The NAS provides air traffic assistance to law enforcement agencies to support special aircraft operations such as in-flight identification, surveillance, interdiction, and pursuit activities.

The Army, Air Force, Navy, Marine Corps and Coast Guard conduct flight activities under their own control and operating regulations, subject to Federal Aviation Regulations (FAR) when operating in the NAS. DoD has been granted exemptions from the FAR when their unique operational conditions require it.

The Interior Department and the United States Department of Agriculture (USDA) are responsible for Federal Land Management. The airspace above these lands is used for navigation in the administration of the public lands. Some altitude restrictions are in place to protect natural wildlife refuge areas.

Natural disaster areas very often have Temporary Flight Restriction (TFR) areas designated to support of relief operations. This is designed to manage numerous relief flights into and out of the area and prevent unnecessary flights.

TFRs are also activated in co-operation with the National Forest Service to support aerial fire suppression operations and keep unnecessary aircraft outside the fire zone. State and local governments, through coordination with the FAA, can request implementation of TFRs over a geographic area for specified events, such as evacuation from a disaster area, train or aircraft accident, police activities, a major fire in city, etc.

Government agencies coordinate their airspace requests through the National Flight Data Center (NFDC), located in the Air Traffic Control System Command Center (ATCSCC), which issues Notices to Airmen (NOTAMs) and coordinates with affected en route centers.

This Government/agency support is provided by telephone. In the event of an emergency, the Command and Control Communications (C3) system provides a secure telephone connection between FAA centers and some other Federal agencies.

Benefits: Current operations are provided in the NAS.

Time Frame: As Implemented

Earliest IOC - Latest IOC: -

Solution Set(s): None

Service: Infrastructure-Information Management Service

Capability: Government-Agency Support

Lead Organization: Not Assigned - Not Assigned

Update Date: 21-Jan-2010 by David Bartlett

ID / Revision: 111 / 2

---

Identifier: 109302

Name: Operational Security Capability for Threat Detection and Tracking, NAS Impact Analysis and Risk-Based Assessment

Description: The Operational Security Personnel of The Air Navigation Service Provider (ANSP) address NAS security threats by more effective and efficient prevention, protection, response and recovery based on net-enabled shared situational awareness and a risk-informed decision-making capability. NAS airspace security measures balance both security and other NAS criteria/goals. Security operations are continuously improved through operational performance analysis.

The ANSP Security personnel have network access to security-relevant data (including surveillance of cooperative and non-cooperative flights) provided by the Security Service Provider (SSP) and Defense Service Provider (DSP). A secure collaboration environment is available for intra-ANSP and inter-ANSP/SSP/DSP coordination and joint decision making.
Flight risk profiles are derived from trajectory-based risk assessment provided by the ANSP and risk levels provided by the Security Service Provider (SSP). These flight-specific risk profiles will be the basis for developing security risk mitigation strategies in all four security missions -- prevent, detect, respond and recover.

Like other constraints, NAS security airspaces are expressed in volumetric expressions, are developed, coordinated, and implemented either off-line or in real-time with considerations given both to national airspace security needs and resultant NAS impact.

NAS security operations data are logged and analyzed with automation tools. Feedbacks and lessons-learned from performance metrics analysis and post-event analysis enable the ANSP security operations to continuously improve.

Benefits: *Increased efficiency
*Increased capacity
*Increased security
*Increased safety

Time Frame: Mid Term

Earliest IOC - Latest IOC: 2015 - 2018

Solution Set(s): Increase Safety, Security, and Environmental Performance

Service: Infrastructure-Information Management Service

Capability: Government-Agency Support

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 24-Feb-2010 by David Bartlett

ID / Revision: 110 / 6

---

Identifier: 109303

Name: ASIAS - Information Sharing and Emergent Trend Detection

Description: Aviation Safety Information Analysis and Sharing (ASIAS) is part of the Federal Aviation Administration's (FAA) comprehensive strategy for a proactive approach to safety. The information analysis and sharing mission directly supports safety promotion and safety assurance initiatives with analytical results such as baseline information and trends; and indirectly support safety risk management through issue identification, information and tools for analysis of hazards. System wide analysis and modeling support risk assessment and management for both existing and future systems by identifying potential systemic risks associated with new systems (in NextGen) as well as existing system. To fully realize the benefits of the SMS approach to safety and reach the safety levels demanded by the public, it will be necessary to address shortcomings in the current aviation system by:

* Replacing inadequate, informal communication with prompt and comprehensive exchanges of aviation safety information
* Coordinating and sharing the resources required to maximize the effectiveness of tool development and issue analysis
* Establishing a collaborative approach to identifying and mitigating system safety issues posing the highest risks.

There are five types of data analyses that can be conducted under Phase 1 ASIAS: Benchmark Analysis, Known Risks Monitoring, Vulnerability Discovery, Tool Development, and Rapid Response (Thread) Study. Applications of ASIAS data to NextGen programs will be conducted by integrating ASIAS data into existing or newly constructed models. Two types of models will be developed; a system-wide baseline, and individual component performance forecasts, each aimed at providing both a high-level estimate of system performance and an integrated analysis of how all of the actors in the system (passengers, operators, controllers, etc.) and domains (airport surface, terminal airspace and enroute airspace) will be affected by system changes.

ASIAS will improve system-wide risk identification, integrated risk analysis and modeling, and implementation of emergent risk management. Source software, meta-ware and analytical processes will be developed to link together existing databases, expert knowledge, the results of experimentation and modeling capability to continually assess the performance of the NAS for safety risk management. For all participants in ASIAS including FAA organizations such as AVS and ATO, industry and other government agencies, ASIAS participants will collaborate to study and evaluate aggregate level system issues within the NAS (2) at the organization level, participants will be able to access ASIAS information and analysis tools to support the safety management of their own operations or those they regulate. Collaborative ASIAS activities allow stakeholders to draw on more information as context, to raise issues to be worked by the larger community, and to share their assessments with others. The aggregation of information and the sharing of benchmarks, analysis tools, and issues create a context and framework for individual stakeholders' SMS activities. The modeling and analysis conducted under SSMT extend the capability of the ASIAS data and stakeholder community to identify and manage systemic risks, as preparation to implementation of NextGen systems, and to monitor the impact of system deployments (including but not exclusively NextGen).

The functions of ASIAS will include:
* Sharing relevant safety information via protected, net-centric approaches that can be used within stakeholder organizations and by ASIAS to permit the setting of system-wide benchmarks
* Sharing the development and use of advanced tools for safety analysis
* Supporting safety communities by providing information and tools that can be used to identify and prioritize risk and design corrective actions.
* Providing data sources for integrated system-wide modeling and forecasts.

ASIAS will benefit safety management at the aggregate level while also enhancing the ability of the stakeholders to manage safety within their organizations.

| | |
|---|---|
| Benefits: | *Enhanced safety<br>*Enhanced efficiency<br>*Reduced system variability - improved capacity |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2013 - 2018 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 24-Feb-2010 by David Bartlett |
| ID / Revision: | 109 / 6 |

---

| | |
|---|---|
| Identifier: | 109304 |
| Name: | Enhanced Aviation Safety Information Analysis and Sharing |
| Description: | Aviation Safety Information Analysis and Sharing (ASIAS) will improve system-wide risk identification, integrated risk analysis and modeling, and implementation of emergent risk management.<br><br>Aviation Safety Information Analysis and Sharing (ASIAS) will improve system-wide risk identification, integrated risk analysis and modeling, and implementation of emergent risk management. Source software, meta-ware and analytical processes will be developed to link together existing databases, expert knowledge, the results of experimentation and modeling capability to continually assess the performance of the Air Transportation System (ATS) for safety risk management. All participants in ASIAS, including FAA (such as AVS and ATO), industry, and other government agencies, will collaborate to study and evaluate aggregate level system issues within the ATS at the organization level. Participants will be able to access ASIAS information and analysis tools to support the safety management of their own operations or those they regulate. Collaborative ASIAS activities allow stakeholders to draw on more information as context, to raise issues to be worked by the larger community, and to share their assessments with others. The aggregation of information and the sharing of benchmarks, analysis tools, and issues create a context and framework for individual stakeholders' SMS activities. The modeling and analysis conducted under the AVS System Safety Management Transformation (SSMT) extend the capability of the ASIAS data and stakeholder community to identify and manage systemic risks, as preparation to implementation of NextGen systems, and to monitor the impact of system deployments (including but not exclusively NextGen). |
| Benefits: | Enhanced safety |

| | |
|---|---|
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2013 - 2014 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 24-Feb-2010 by David Bartlett |
| ID / Revision: | 95 / 6 |

---

| | |
|---|---|
| Identifier: | 109305 |
| Name: | Improved Safety for NextGen Evolution |
| Description: | This OI mitigates safety risk associated with the evolution of NextGen by providing enhanced safety methods that support making changes to the air transportation system, including: advanced capabilities for integrated, predictive safety assessment; improved validation and verification (V&V) processes supporting certification; an enhanced focus on safe operational procedures; and enhanced training concepts for safe system operation.<br><br>This OI mitigates safety risk associated with the evolution of NextGen by providing enhanced safety methods that support making changes to the air transportation system, including: advanced capabilities for integrated, predictive safety assessment; improved validation and verification (V&V) processes supporting certification; an enhanced focus on safe operational procedures; and enhanced training concepts for safe system operation. Developers discover and mitigate hazards more quickly allowing the flying public and ATS stakeholders to experience a safety benefit through more rapid and reliable implementation of NextGen systems. An advanced integrated, predictive safety assessment capability will ensure the management of safety risk associated with complex systems and interactions between these systems. It will involve the monitoring of system safety performance to accelerate the detection of unrecognized safety risks and thus contribute to overall safer operational practices. Improved V&V processes will ensure that systems are certified to be reliable enough to perform automated operations, to include recovery from critical failures, without compromising safe operations. Automated operations are necessary to achieve Air Transportation System efficiency and capacity benefits. As particular operations become more automated, newly developed operational procedures that involve human interaction must be optimized with assurance that an acceptable level of safety is maintained. Additionally, advanced training concepts will maintain levels of proficiency for humans to conduct safe operations in place of degraded or failed automation. |
| Benefits: | Enhanced safety |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2016 - 2017 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |

Capability: Government-Agency Support

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 27-Jan-2010 by Charles Horne

ID / Revision: 108 / 5

---

Identifier: 109306

Name: Increased International Cooperation for Aviation Safety

Description: This OI promotes worldwide aviation safety enhancements for the traveling public through international participation in the development and implementation of safer practices and safer systems. Additionally, it contributes to the continued viability of the U.S. Aviation industry by supporting the required harmonization of international standards for an interoperable SMS.

This OI promotes worldwide aviation safety enhancements for the traveling public through international participation in the development and implementation of safer practices and safer systems. Specifically, increased U.S. participation in international aviation results in the establishment of safety-enhancing international aviation partnerships; e.g., U.S. support for the execution of the International Civil Aviation Organization (ICAO) Global Aviation Safety Roadmap and the associated implementation plan. This OI also contributes to the continued viability of the U.S. Aviation industry by supporting the required harmonization of international standards for an interoperable SMS.

Benefits: Enhanced safety

Time Frame: Far Term

Earliest IOC - Latest IOC: 2019 - 2020

Solution Set(s): Increase Safety, Security, and Environmental Performance

Service: Infrastructure-Information Management Service

Capability: Government-Agency Support

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 28-Jan-2010 by David Bartlett

ID / Revision: 107 / 5

---

Identifier: 109307

| | |
|---|---|
| Name: | Improved Safety Across Air Transportation System Boundaries |
| Description: | The increase in safety risk associated with intermodal and international operations is eliminated by harmonizing standards, regulations and procedures, and improving their implementation.<br><br>The increase in safety risk associated with intermodal and international operations is eliminated by harmonizing standards, regulations and procedures, and improving their implementation.  In particular, the safety of dangerous goods handling for air transportation is improved through intermodal and international harmonization of standards that ensures sufficient information to support risk management for and among all modes of transportation resulting in reduced net transportation risk. |
| Benefits: | Enhanced safety |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2019 - 2020 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Jan-2010 by David Bartlett |
| ID / Revision: | 106 / 5 |

---

| | |
|---|---|
| Identifier: | 109308 |
| Name: | Enhanced (Automated) Aviation Safety Information Sharing and Analysis Scope and Effectiveness |
| Description: | This OI will enhance aviation operational safety and contribute to reduced risk by automating risk identification and notification processes in the Aviation Safety Information Analysis and Sharing (ASIAS).<br><br>This OI will enhance aviation operational safety and contribute to reduced risk by automating risk identification and notification processes in the Aviation Safety Information Analysis and Sharing (ASIAS). Following the creation of the ASIAS environment and the integration of existing analytical tools within it, improvements will be made to the environment and the analytical capabilities to extend their coverage, improve the speed of risk identification and notification, and enhance safety mitigation evaluation. Expansion of the ASIAS environment to include additional data sources, combined with actions that improve data security, quality, and scope will provide continuous improvement of the ASIAS environment.  Improvements in the analytical techniques and tools used to extract information from the various data sources will continuously improve the understanding of the data and its implications. |
| Benefits: | Enhanced safety |
| Time Frame: | Far Term |

| | |
|---|---|
| Earliest IOC - Latest IOC: | 2019 - 2020 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Jan-2010 by David Bartlett |
| ID / Revision: | 105 / 5 |

---

| | |
|---|---|
| Identifier: | 109309 |
| Name: | Implement EMS Framework |
| Description: | Enable the use of the Environmental Management System (EMS) framework, including environmental goals and decision support tools, to address, plan and mitigate environmental issues, through development of an initial EMS framework, pilot analysis, and outreach programs. |
| Benefits: | Mitigate environmental issues |
| Time Frame: | Near Term |
| Earliest IOC - Latest IOC: | 2011 - 2011 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 28-Apr-2010 by David Bartlett |
| ID / Revision: | 104 / 4 |

---

| | |
|---|---|
| Identifier: | 109310 |
| Name: | Implement EMS Framework - Enhanced |
| Description: | Further enable the use of the Environmental Management System (EMS) framework for subsequent applications, including refined environmental goals and decision support tools, to address, plan and mitigate environmental issues through implementation of ongoing EMS improvements and availability of enhanced environmental information. |
| Benefits: | Mitigate environmental issues |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2018 - 2018 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 103 / 6 |

| | |
|---|---|
| Identifier: | 109311 |
| Name: | Environmentally and Energy Favorable En Route Operations |
| Description: | Optimize En Route operations to reduce emissions, fuel burn and noise. Apply new operational capabilities such as advanced aircraft technologies including capabilities for Flight Management Systems (FMS) and avionics to achieve more efficient en route operations. Improve efficiency in operations sytemwide including, as appropriate, in sensitive areas (e.g., national parks). |
| Benefits: | Reduce emissions, fuel burn, and noise |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2015 - 2015 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |

| | |
|---|---|
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 102 / 6 |

---

| | |
|---|---|
| Identifier: | 109312 |
| Name: | Environmentally and Energy Favorable En Route Operations - Enhanced |
| Description: | Further optimization of En Route operations to reduce emissions, fuel burn and noise. Utilize environmental management system embedded into real time route planning to reduce environmental impact.  Improve efficiency in operations sytemwide including, as appropriate, in sensitive areas (e.g., national parks). |
| Benefits: | Reduce emissions, fuel, and noise |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2020 - 2020 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 101 / 6 |

---

| | |
|---|---|
| Identifier: | 109313 |
| Name: | Environmentally and Energy Favorable Terminal Operations |

| | |
|---|---|
| Description: | Optimize aircraft arrival, departure, and surface operations to reduce emissions, fuel burn, and noise through the use of environmentally friendly procedures. Develop Standard Terminal Arrival (STAR) procedures that permit use of the Optimized Profile Descent (OPD) technique (also known as Continuous Descent Arrival, or CDA). Develop area navigation (RNAV) Standard Instrument Departure (SID) procedures that minimize level segments on climb out. Develop enhanced surface operation mechanisms and procedures to maximize airport throughput while further reducing aircraft fuel burn and emissions. |
| Benefits: | Reduce emissions, fuel burn, and noise |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2015 - 2015 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 100 / 6 |

---

| | |
|---|---|
| Identifier: | 109314 |
| Name: | Environmentally and Energy Favorable Terminal Operations - Enhanced |
| Description: | Further optimization of aircraft arrival, departure, and surface operations to reduce emissions, fuel burn, and noise. Use of environmentally friendly procedures managed through an Environmental Management System (EMS), such as Optimized Profile Descent (OPD)/Area Navigation (RNAV) procedures and use of automation and enhanced surveillance to schedule and control arriving and departing aircraft in an optimum manner to reduce environment and energy use impacts. OPD is also known as Continuous Descent Arrival (CDA). |
| Benefits: | Reduce emissions, fuel burn, and noise |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2020 - 2020 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |

| | |
|---|---|
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 97 / 6 |

---

| | |
|---|---|
| Identifier: | 109315 |
| Name: | Implement NextGen Environmental Engine and Aircraft Technologies |
| Description: | Reductions in aircraft noise, emissions, and fuel burn through improvements in aircraft engine and airframe technologies and alternative fuels. Technologies will be at sufficient readiness level to achieve the goals of the Federal Aviation Administration (FAA) Continuous Low Emissions, Energy, and Noise (CLEEN) program. |
| Benefits: | Reduce emissions, fuel burn, and noise |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2015 - 2015 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 26-Apr-2010 by David Bartlett |
| ID / Revision: | 99 / 5 |

---

| | |
|---|---|
| Identifier: | 109316 |
| Name: | Increased Use of Alternative Aviation Fuels |
| Description: | Determine the feasibility and market viability of alternative aviation fuels for civilian aviation use.  Obtain American Society for Testing and Materials (ASTM) certification of Hydrotreated Renewable Jet (HRJ) fuels from fossil and renewable resources that are compatible with existing infrastructure and fleet thus meeting requirement to be a "drop in" alternative fuel. |

| | |
|---|---|
| Benefits: | Reduced emissions |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2015 - 2015 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 27-Jan-2010 by Charles Horne |
| ID / Revision: | 98 / 4 |

---

| | |
|---|---|
| Identifier: | 109317 |
| Name: | Operational Security Capability with Dynamic Flight Risk Assessment for Improved Security Airspace Planning and Manageme |
| Description: | Security Restricted Airspace (SRA), represented by volumetric expressions, is defined and managed by the Air Navigation Service Provider (ANSP) or its designee using an integrated airspace planning, configuration, and distribution capability to establish time-dependent and risk-based security restriction parameters.<br><br>Through inter-agency net-enabled infrastructure (NEI) and Air Ground data communication capability, the ANSP Security personnel receive automated updates of in-flight dynamic security-relevant information and associated flight risk profile updates provided by the Security Service Provider (SSP). Built upon the foundation of the National Airspace System's (NAS) mid-term operational security capabilities, NAS security airspaces will be adjusted/updated/coordinated/implemented dynamically that their access restrictions and flights' allowable proximity to them will be variable based on the flight risk profile and its current trajectories.<br><br>Such a security airspace management framework incorporating the flight risk profile (examples of consideration: air vehicle type, origin/destination, trajectory compliance behavior, communication status, security certificate status, Law Enforcement personnel presence, passenger of interest, aircraft security measures on board, etc.).<br><br>Changes in flight-specific Security Airspace restrictions are coordinated automatically with SSP, Defense Service Provider (DSP), Flight Operations Center (FOC ) and NAS facilities through the NextGen NEI while the notification to the cockpit is through Air/Ground data communication. Such automated capabilities provide stakeholders with timely airspace security restrictions information; consequently, reduce the likelihood of unintentional airspace violations and subsequent deployment of interdiction assets by the DSP. |
| Benefits: | Enhanced security |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2025 - 2025 |

| | |
|---|---|
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 23-Mar-2010 by David Bartlett |
| ID / Revision: | 96 / 6 |

---

| | |
|---|---|
| Identifier: | 109318 |
| Name: | Implement NextGen Environmental Engine and Aircraft Technologies - Enhanced |
| Description: | Further enable reductions in aircraft noise, emissions, and fuel consumption by incorporating Next-Generation improvements in aircraft engine and airframe technologies, alternative fuels, and national airspace system infrastructure optimization. |
| Benefits: | Reduce emissions, fuel burn, and noise |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2021 - 2021 |
| Solution Set(s): | Increase Safety, Security, and Environmental Performance |
| Service: | Infrastructure-Information Management Service |
| Capability: | Government-Agency Support |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Apr-2010 by David Bartlett |
| ID / Revision: | 135 / 3 |

---

| | |
|---|---|
| Identifier: | 109401 |

| | |
|---|---|
| Name: | Current Air Traffic Operations Facilities |
| Description: | Under development |
| Benefits: | Under development |
| Time Frame: | As Implemented |
| Earliest IOC - Latest IOC: | - |
| Solution Set(s): | None |
| Service: | Infrastructure-Information Management Service |
| Capability: | Air Traffic Operations Facilities |
| Lead Organization: | Not Assigned - Not Assigned |
| Update Date: | 21-Jan-2010 by David Bartlett |
| ID / Revision: | 131 / 2 |

---

Identifier: 109402

Name: Remotely Staffed Tower Services

Description:

Remotely Staffed Towers provide ATM services for operations into and out of designated airports without physically constructing, equipping, and/or sustaining tower facilities at these airports. Instead of out-the-window visual surveillance, controllers maintain situational awareness provided by surface surveillance displayed on an ANSP display system and a suite of decision support tools using aircraft-derived data.

Weather, traffic and other relevant information are displayed on the ANSP display system to avoid discontinuities associated with the mix of heads-up versus heads-down operations.
With the deployment of Remotely Staffed Towers, ANSP personnel may be able to service multiple airfields from a single physical location allowing for reductions in the total number of service delivery points. This accommodates managing increases in life cycle costs to sustain, expand, and improve services in response to steadily increasing demand.
In the end-state Remotely Staffed Towers will provide advanced surface management. The ANSP personnel will have access to the necessary ground and terminal surveillance information and decision support tools to provide separation, sequencing, and spacing services. Decision support tools will assist ANSPs with planning taxi routes, and arrival and departure sequencing. Clearance delivery and pushback into movement or non-movement areas is accomplished by voice and/or data communications to the aircraft, aided by situational awareness derived from surveillance sensors and conformance monitoring tools presented directly on the ANSP display. Some separation responsibility and some traffic synchronization responsibility are delegated to properly equipped aircraft.
To improve common situational awareness, weather, traffic management initiatives, and flight plan data are available to ANSPs and flight operators via net-centric information capabilities. Weather data is distributed to and from aircraft using digital communications and will conform to the NextGen Network Enabled Weather (NNEW) concept. Special airport sensors detect runway hazards at the airport and automatically alert controllers and pilots of the hazard via voice and/or Data Comm.

| | |
|---|---|
| Benefits: | *Increased airport capacity in low visibility and night conditions<br>*Improvement in runway incursion alerting<br>*Improvement in availability and performance of ATM services at airports<br>*Reduced cost of sustaining, expanding, and improving ATM services at airports |
| Time Frame: | Mid Term |
| Earliest IOC - Latest IOC: | 2018 - 2020 |
| Solution Set(s): | Transform Facilities |
| Service: | Infrastructure-Information Management Service |
| Capability: | Air Traffic Operations Facilities |
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 27-Jan-2010 by Charles Horne |
| ID / Revision: | 130 / 5 |

---

| | |
|---|---|
| Identifier: | 109404 |
| Name: | Automated Virtual Towers |
| Description: | Throughput at low- to moderate-demand airports (when tower is non-operational) and non-towered airports is increased through the use of automated tower services.<br><br>The automation provides a variety of services from sequencing and basic airport information to limited separation management. IFR throughput (in both IMC and VMC) is increased through utilization of both ground and air surveillance systems and by exploiting available aircraft capabilities. Airport complexity and demand as well as customers' needs and capabilities are carefully determined, then appropriate levels of automation and modes of communication are installed to maximize capacity while still meeting cost/benefit and safety analyses. An automated voice interface ensures that minimally equipped aircraft receive service. |
| Benefits: | Increased capacity |
| Time Frame: | Far Term |
| Earliest IOC - Latest IOC: | 2020 - 2023 |
| Solution Set(s): | Transform Facilities |
| Service: | Infrastructure-Information Management Service |
| Capability: | Air Traffic Operations Facilities |

| | |
|---|---|
| Lead Organization: | Integration Managers Group - AJP-A3 |
| Update Date: | 28-Jan-2010 by David Bartlett |
| ID / Revision: | 129 / 5 |

---

Identifier: 109405

Name: Business Continuity Services

Description:

The NextGen net-centric and geo-independent system architecture will allow improved ATM business continuity services throughout the NAS in the event of a facility shutdown or incapacity. Implementing NextGen business continuity will improve service by reducing the number of aircraft delays in the event of a long-term facility outage.

In the event of a long-term facility outage due to man-made or natural causes, critical ATM services will be divested from an affected facility and reconstituted at accommodating facilities. Homeland Security Presidential Directive-7 (HSPD-7) establishes a national policy for Federal departments and agencies to identify and prioritize critical infrastructure and to protect them from terrorist attacks. This operational improvement leverages the HSPD-7 policy to provide business continuity services for critical ATM services affected by terrorist and other man-made causes and natural disasters. All components of critical ATM services will be addressed, including automation, surveillance, weather, and voice and data communications. Accounting for necessary physical space for systems and equipment in facility planning and planning for a trained contingent of personnel efficiently mitigates the effects on ATM services.

Business continuity services will restore up to 100% of critical services in as little as one week. This will greatly mitigate the economic impact of long-term facility outages and resultant loss of ATM services on our nation's economy.

Benefits:

Enhanced efficiency
Improved flexibility
Enhanced personnel safety and security
Fewer ATC delays

Time Frame: Far Term

Earliest IOC - Latest IOC: 2018 - 2025

Solution Set(s): Transform Facilities

Service: Infrastructure-Information Management Service

Capability: Long Term Planning

Lead Organization: Integration Managers Group - AJP-A3

Update Date: 28-Apr-2010 by David Bartlett

ID / Revision: 136 / 4